In The United States Patent and Trademark Office
On Appeal From The Examiner To The Board
of Patent Appeals and Interferences

In re Application of:	Rand B. Nickerson, et al.
Serial No.:	10/630,426
Filing Date:	July 29, 2003
Group Art Unit:	2168
Examiner:	Mahesh H. Dwivedi
Confirmation No.:	7833
Title:	Providing Substantially Real-Time Access to Collected Information Concerning User Interaction with a Web Page of a Website

Mail Stop Appeal Brief - Patents
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Appeal Brief

Appellants have appealed to the Board of Patent Appeals and Interferences ("Board") from the Office Action mailed November 14, 2006 finally rejecting pending Claims 1-34 ("Final Office Action") and the Advisory Action mailed February 8, 2007. Appellants filed a Notice of Appeal on February 14, 2007. Appellants respectfully submit this Appeal Brief with the statutory fee of $250.00.

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Real Party In Interest

This Application is owned by OpinionLab, Inc., as indicated by an Assignment recorded on July 29, 2003 in the Assignment Records of the PTO at Reel 014359, Frame 0548 (6 pages).

Related Appeals and Interferences

No known appeals, interferences, or judicial proceedings are related to or will directly affect, be directly affected by, or have a bearing on the Board's decision regarding this Appeal.

Status of Claims

Claims 1-34 are pending in this Application, stand rejected pursuant to the Final Office Action mailed November 14, 2006, and are presented for appeal. All pending claims are shown in Appendix A, along with an indication of the status of those claims.

Status of Amendments

All amendments submitted by Appellants were entered by the Examiner prior to the mailing of the Final Office Action.

Summary of Claimed Subject Matter

The claimed invention relates to systems and methods for providing substantially real-time access to collected information concerning user interaction with a web page of a website. (Page 1, Lines 7-8). Certain embodiments of the invention may enable a website owner to, while viewing a particular web page, perform a substantially real-time look-up of user feedback information concerning the particular web page that has been collected from users who have accessed the particular web page. (Page 5, Lines 23-26). Certain embodiments may be useful to a content manager who is responsible for particular web pages of a website and wants to analyze user feedback information concerning only those particular web pages. (Page 5, Lines 27-29). Certain embodiments may also be useful to others who may want to review unfiltered user feedback information directly from any web page of a company's website. (Page 5, Line 30 - Page 6, Line 2).

Figure 1 illustrates an example system for measuring and reporting user feedback to particular web pages.

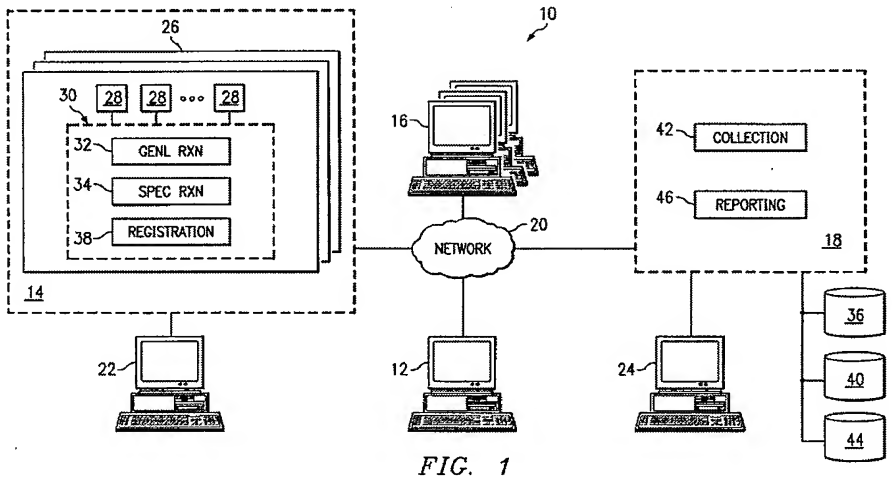


FIG. 1

According to certain embodiments, system 10 may include web server 14 and reporting server 18. (Page 9, Lines 27-28). Web server 14 hosts or otherwise supports at least one website 26 including one or more web pages 28. (Column 10, Lines 11-12). According to certain embodiments, a user 16 may establish a connection to server 14 and access a particular web page 28. (Page 10, Lines 17-20). Each user 16 may have an opinion, assessment, feeling, or other subjective reaction to each web page 28 communicated to the user 16, either in its entirety or more specifically to the format, content, design, or another characteristic associated with web page 28. (Page 10, Line 29 - Page 11, Line 1). In certain embodiments, feedback from a user 16 concerning web page 28 may reflect one or more reactions of user 16 to web page 28 and may, where appropriate, include ratings, comments, answers to explicit questions, or any other suitable general or specific user feedback concerning web page 28. (Page 11, Lines 12-17).

In one embodiment, server 14 supports a user feedback measurement tool 30 that is incorporated into web page 28 and may be communicated to user 16 with web page 28. (Page 11, Lines 23-25). In a particular embodiment, tool 30 includes software code incorporated into the HTML, XML, or other software code of web page 28. Tool 30 may also include one or more scripts that may be stored in a dedicated or other suitable directory.

(Page 11, Line 29 - Page 12, Line 1). Figures 3-6 illustrate example feedback measurement tools according to particular embodiments.

FIG. 3

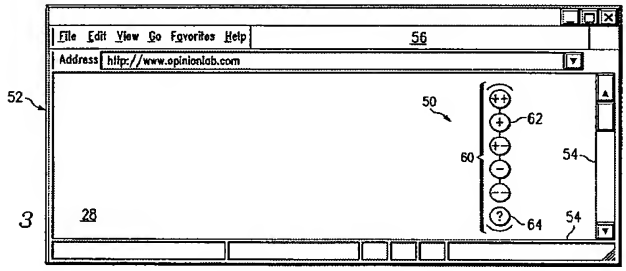


FIG. 4

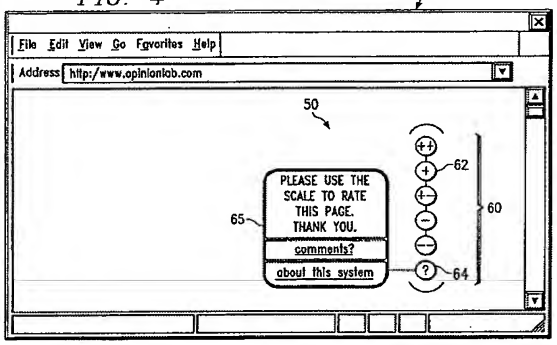


FIG. 5

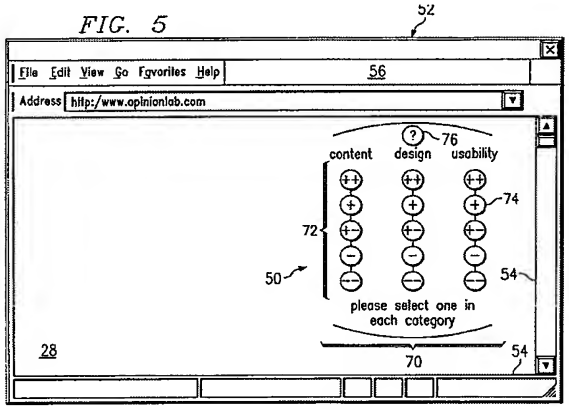
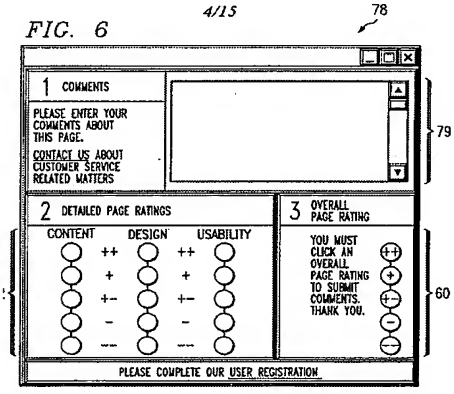


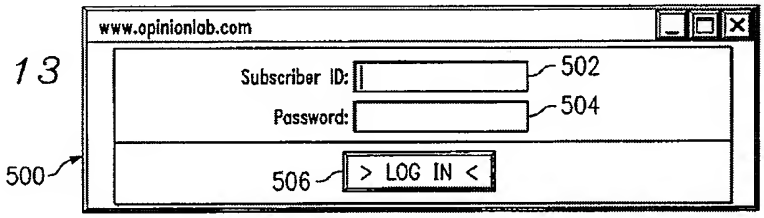
FIG. 6



In certain embodiments, web page 28 may provide website owner 12 access to collected user feedback information concerning a particular web page 28. (Page 50, Lines 24-25). In particular embodiments, website owner 12 may launch a feedback-viewing application for viewing collected feedback information concerning web page 28 by accessing web page 28 using a web browser and, while web page 28 is viewable, entering a particular keystroke using a keyboard or otherwise indicating a desire to access collected user feedback information concerning web page 28. (Page 51, Lines 12-16). The feedback-viewing application launched by website owner 12 may be provided by any suitable software component associated with web page 28. (Page 51, Lines 27-28). As an example, in particular embodiments, feedback measurement tool 30 may include one or more modules that provide the feedback-viewing application. (Page 51, Lines 29-30).

Figure 13 illustrates an example password window 500 that may be presented to owner 12 after the feedback-viewing application has been launched. (Page 52, Lines 3-5).

FIG. 13



In certain embodiments, the feedback-viewing application may require website owner 12 to enter a valid subscriber ID and a valid password before the feedback-viewing application provides website owner 12 access to collected user feedback information concerning web page 28. (Page 52, Lines 5-8). For example, the feedback-viewing application may determine whether the subscriber ID and the password entered by website owner 12 are valid. (Page 52, Lines 13-15). According to this example, if the subscriber ID and the password entered by website owner 12 are valid, the feedback-viewing application may allow website owner to access collected user feedback information concerning web page 28. (Page 52, Lines 15-17). Figures 15 and 16 illustrate an example displays that may be generated by feedback-viewing application to present collected user feedback to website owner 12.

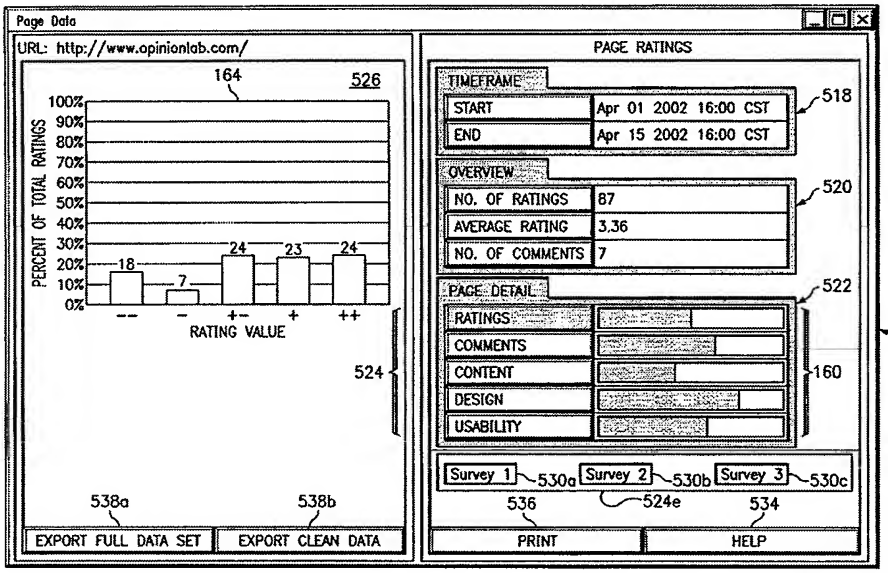


FIG. 15

12/15

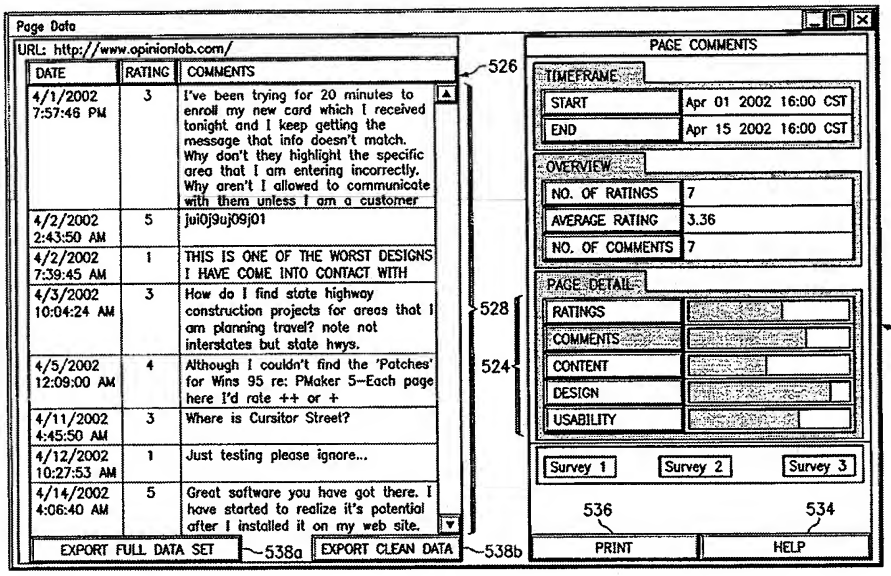


FIG. 16

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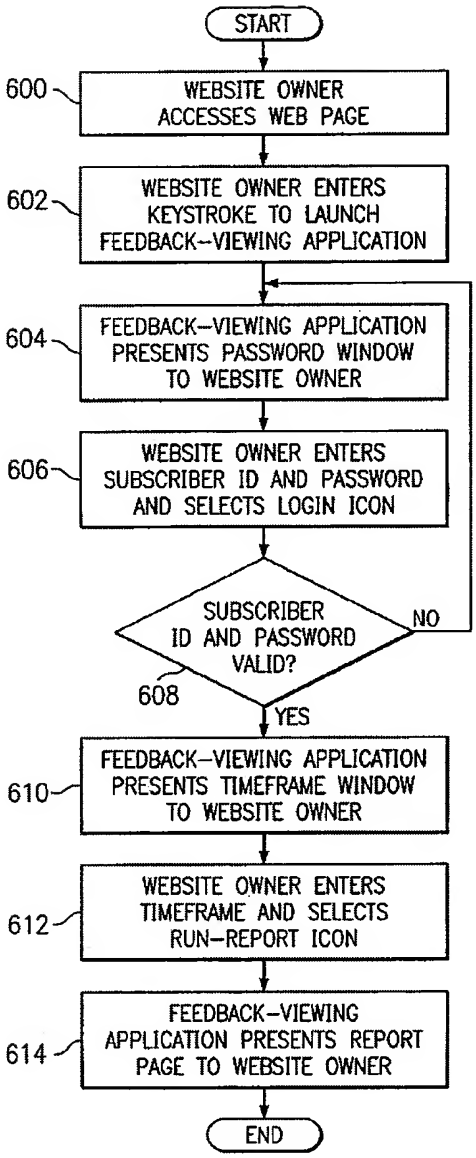
Figure 19 illustrates an example method for providing substantially real-time access to collected information concerning user interaction with a web page of a website. (Page 8, Lines 3-5). The example method begins at step 600, where website owner 12 accesses web page 28. (Page 57, Lines 29-30). At step 602, ***while web page 28 is still viewable***, website owner 12 enters a particular keystroke or other suitable input to launch a feedback-viewing application associated with web page 28. (Page 57, Line 29 - Page 58, Line 1). At step 604, the feedback-viewing application presents a password window 510 to website owner 12. (Page 57, Lines 28-29). At step 606, website owner 12 enters a subscriber ID and a password and selects login button 506. At step 608, if the subscriber ID and the password entered by website owner 12 are invalid, the method returns to step 604. At step 608, if the subscriber ID and the password entered by website owner 12 are valid, the example method proceeds to step 610. At step 610, the feedback-viewing application presents time frame window 510 to website owner 12. At step 612, website owner 12 enters a time frame and selects run-report button 514. At step 614, the feedback-viewing application presents report page 516 to website owner 12 according to the entered time frame, at which point the example method ends.

FIG. 19



With regard to the independent claims currently under Appeal, Appellants provide the following concise explanation of the subject matter recited in the claim elements. For brevity, Appellants does not necessarily identify every portion of the Specification and drawings relevant to the recited claim elements. Additionally, this explanation should not be used to limit Appellants' claims but is intended to assist the Board in considering the Appeal of this Application.

For example, independent Claim 1 recites:

A system for providing substantially real-time access to collected information concerning user interaction with a particular web page of a website, the system comprising:

first software associated with a particular web page of a website and operable to collect information concerning user interaction with the particular web page (*see e.g.,* Page 11, Line 23 - Page 13, Line 5; Page 21, Lines 3-6); and

second software associated with the particular web page operable to:

receive, from a website owner who has accessed the particular web page using a web browser while the particular web page is viewable within a browser window of the web browser, input indicating a desire to access the collected information concerning user interaction with the particular web page (*see e.g.,* Page 50, Line 24 - Page 52, Line 2; Page 57, Line 30 - Page 58, Line 1);

determine whether the website owner is authorized to access the collected information concerning user interaction with the particular web page (*see e.g.,* Page 52, Lines 3-20; Page 58, Lines 3-7); and

if the website owner is authorized to access the collected information concerning user interaction with the particular web page:

generate a viewable user interface providing substantially real-time access to the collected information concerning user interaction with the particular web page (*see e.g.,* Page 54, Line 14 - Page 55, Line 6; Page 58, Lines 11-13); and

to provide the website owner substantially real-time access to the collected information concerning user interaction with the particular web page, present the viewable user interface to the website owner in substantially real-time in response to the input received from the website owner while the particular web page was viewable within the browser window of the web browser (*see e.g.,* Page 8, Lines 3-5; Page 57, Line 28 - Page 58, Line 19).

As another example, independent Claim 12 recites:

A method for providing substantially real-time access to collected information concerning user interaction with a particular web page of a website, the method comprising:

collecting information concerning user interaction with a particular web page of a website (*see e.g.,* Page 11, Line 23 - Page 13, Line 5; Page 21, Lines 3-6);

receiving, from a website owner who has accessed the particular web page using a web browser while the particular web page is viewable within a browser window of the web browser, input indicating a desire to access the collected information concerning user interaction with the particular web page (*see e.g.,* Page 50, Line 24 - Page 52, Line 2; Page 57, Line 30 - Page 58, Line 1);

determining whether the website owner is authorized to access the collected information concerning user interaction with the particular web page(*see e.g.,* Page 52, Lines 3-20; Page 58, Lines 3-7); and

if the website owner is authorized to access the collected information concerning user interaction with the particular web page:

generating a viewable user interface providing substantially real-time access to the collected information concerning user interaction with the particular web page (*see e.g.,* Page 54, Line 14 - Page 55, Line 6; Page 58, Lines 11-13); and

to provide the website owner substantially real-time access to the collected information concerning user interaction with the particular web page, presenting the viewable user interface to the website owner in substantially real-time in response to the input received from the website owner while the particular web page was viewable within the browser window of the web browser (*see e.g.,* Page 8, Lines 3-5; Page 57, Line 28 - Page 58, Line 19).

As another example, independent Claim 23 recites:

Software for providing substantially real-time access to collected information concerning user interaction with a particular web page of a website while the particular web page is viewable, the software embodied in media and when executed operable to:

receive, from a website owner who has accessed a particular web page of a website and using a web browser while the particular web page is viewable within a browser window of the web browser, input indicating a desire to access collected information concerning user interaction with the particular web page (*see e.g.,* Page 50, Line 24 - Page 52, Line 2; Page 57, Line 30 - Page 58, Line 1);

determine whether the website owner is authorized to access the collected information concerning user interaction with the particular web page (*see e.g.,* Page 52, Lines 3-20; Page 58, Lines 3-7); and

if the website owner is authorized to access the collected information concerning user interaction with the particular web page:

generate a viewable user interface providing substantially real-time access to the collected information concerning user interaction with the

particular web page (*see e.g.,* Page 54, Line 14 - Page 55, Line 6; Page 58, Lines 11-13); and

to provide the website owner substantially real-time access to the collected information concerning user interaction with the particular web page, present the viewable user interface to the website owner in substantially real-time in response to the input received from the website owner while the particular web page was viewable within the browser window of the web browser (*see e.g.,* Page 8, Lines 3-5; Page 57, Line 28 - Page 58, Line 19).

As another example, independent Claim 34 recites:

A system for providing substantially real-time access to collected information concerning user interaction with a particular web page of a website, the system comprising:

means for collecting information concerning user interaction with a particular web page of a website (*see e.g.,* Page 11, Line 23 - Page 13, Line 5; Page 21, Lines 3-6); and

means for receiving, from a website owner who has accessed the particular web page using a web browser and while the particular web page is viewable within a browser window of the web browser, input indicating a desire to access the collected information concerning user interaction with the particular web page (*see e.g.,* Page 50, Line 24 - Page 52, Line 2; Page 57, Line 30 - Page 58, Line 1);

means for determining whether the website owner is authorized to access the collected information concerning user interaction with the particular web page (*see e.g.,* Page 52, Lines 3-20; Page 58, Lines 3-7); and

means for, if the website owner is authorized to access the collected information concerning user interaction with the particular web page:

generating a viewable user interface providing substantially real-time access to the collected information concerning user interaction with the particular web page (*see e.g.,* Page 54, Line 14 - Page 55, Line 6; Page 58, Lines 11-13); and

to provide the website owner substantially real-time access to the collected information concerning user interaction with the particular web page, presenting the viewable user interface to the website owner in substantially real-time in response to the input received from the website owner while the particular web page is viewable within the browser window of the web browser (*see e.g.,* Page 8, Lines 3-5; Page 57, Line 28 - Page 58, Line 19).

Grounds of Rejection to be Reviewed on Appeal

Appellants request the Board to review the Examiner's rejection of Claims 1-5, 10-16, 21-27, and 32-34 under 35 U.S.C. § 102(e).

Appellants request the Board to review the Examiner's rejection of Claims 6-9, 17-20, and 28-31 under 35 U.S.C. § 103(a).

Argument

For at least the following reasons, the Examiner's rejections of Claims 1-34 are improper and should be reversed.

I. Claims 1-5, 10-16, 21-27 and 32-34 are Allowable over *Muret*

In the Final Office Action, the Examiner rejected Claims 1-5, 10-16, 21-27, and 32-34 under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,792,458 B1 to Muret, et al. (*"Muret"*). Appellants respectfully disagree. A copy of *Muret* is included in Appendix B.

Independent Claim 1 recites:

> A system for providing substantially real-time access to collected information concerning user interaction with a particular web page of a website, the system comprising:
>
> first software associated with a particular web page of a website and operable to collect information concerning user interaction with the particular web page; and
>
> **second software associated with the particular web page operable to:**
>
> **receive, from a website owner who has accessed the particular web page using a web browser while the particular web page is viewable within a browser window of the web browser, input indicating a desire to access the collected information concerning user interaction with the particular web page;**
>
> determine whether the website owner is authorized to access the collected information concerning user interaction with the particular web page; and
>
> if the website owner is authorized to access the collected information concerning user interaction with the particular web page:

> generate a viewable user interface providing substantially real-time access to the collected information concerning user interaction with the particular web page; and
>
> to provide the website owner substantially real-time access to the collected information concerning user interaction with the particular web page, **present the viewable user interface to the website owner in substantially real-time in response to the input received from the website owner while the particular web page was viewable within the browser window of the web browser.**

Independent Claims 12, 23, and 34 recite substantially similar limitations. Appellants respectfully submit that *Muret* fails to disclose, teach, or suggest the combination of elements recited in any of Claims 1, 12, 23, and 34. For example, *Muret* fails to disclose, teach, or suggest software "associated with the particular web page" such that, as recited in Claim 1, it is operable to:

(1) "receive, from a website owner who has accessed the particular web page using a web browser while the particular web page is viewable within a browser window of the web browser, input indicating a desire to access the collected information concerning user interaction with the particular web page;" and

(2) "present the viewable user interface to the website owner in substantially real-time in response to the input received from the website owner while the particular web page was viewable within the browser window of the web browser."

The specification describes certain technical advantages associated with particular embodiments of a system that includes the features recited in Claim 1. According to the specification, "particular embodiments may enable a website owner to, while viewing a particular web page, perform a substantially real-time look-up of user feedback information concerning the particular web page." (Page 5, Lines 23-25). These embodiments may be advantageous to those who may want to review user feedback information "directly from any web page of a company's website." (Page 5, Line 30 - Page 6, Line 2).

The Examiner asserts that the "user 530 send[ing] a report request 540 to the report engine 400 via a web browser 520" disclosed in *Muret* can be properly construed as "second software associated with the particular web page operable to: receive, from a website owner who has accessed the particular web page using a web browser while the particular web page is viewable within a browser window of the web browser, input indicating a desire to access

the collected information concerning user interaction with the particular web page," as recited in Claim 1. (*See* Final Office Action, Pages 4-5). However, nothing in *Muret* discloses that report request 540, report engine 400, or web browser 520 are "***associated with the particular web page***" as recited in Claim 1. Accordingly, neither the report request 540, the report engine 400, nor the web browser 520 can be properly construed as "second software ***associated with the particular web page***," as recited in Claim 1.

Furthermore, to the extent the Examiner is asserting that user 530 can be properly construed as "a website owner," as recited in Claim 1, Appellants respectfully submit that nothing in *Muret* discloses that user 530 accesses the particular web page, much less that any software disclosed in *Muret* receives input from user 530 (or any other entity) indicating a desire to access information concerning the particular web page, "***while the particular web page is viewable within a browser window of the web browser.***" Accordingly, the report engine 400 receiving a report request 540 sent by user 530, disclosed in *Muret*, cannot be properly construed as "second software associated with the particular web page operable to: receive, from a website owner who has accessed the particular web page using a web browser ***while the particular web page is viewable within a browser window of the web browser***, input indicating a desire to access the collected information concerning user interaction with the particular web page," as recited in Claim 1.

The Examiner also asserts that system 100 with report engine 400, disclosed in *Muret,* can be properly construed as "present[ing] the viewable user interface to the website owner in substantially real-time in response to the input received from the website owner while the particular web page was viewable within the browser window of the web browser," as recited in Claim 1. (*See* Final Office Action, Pages 5-6). However, as discussed above, nothing in *Muret* discloses that any software receives input from user 530 (or any other entity) indicating a desire to access information concerning the particular web page, "***while the particular web page is viewable within a browser window of the web browser.***" Accordingly, *Muret* necessarily fails to disclose software associated with the particular web page operable to "present the viewable user interface to the website owner in substantially real-time ***in response to the input received from the website owner while the particular web page was viewable within the browser window of the web browser***," as recited in Claim 1.

Thus, *Muret* fails to disclose, teach, or suggest each and every limitation recited in Claim 1. Claim 1 is allowable for at least this reason and Claims 12, 23, and 34 are allowable for at least substantially similar reasons. Dependent Claims 2-5, 10-11, 13-16, 21-22, 24-27 and 32-33 are allowable at least because they depend from Claims 1, 12, and 23.

For at least these reasons, Appellants respectfully request that the Board reverse the Examiner's rejection of Claims 1-5, 10-16, 21-27 and 32-34.

II. Claims 6-9, 17-20, and 28-31 are Allowable over the Proposed *Muret-Kurzrok* Combination

In the Final Office Action, the Examiner rejects Claims 6-9, 17-20, and 28-31 under 35 U.S.C. §103(a) as being unpatentable over *Muret* in view of U.S. Patent No. 6,260,064 B1 to Kurzrok (*"Kurzrok"*). Appellants respectfully disagree. A copy of *Kurzrok* is included in Appendix B.

Dependent Claims 6-9, 17-20, and 28-31 depend from independent Claims 1, 12, and 23 respectively. With respect to the elements of independent Claims 1, 12, and 23, the Examiner relies on the disclosure of *Muret* and cites to portions of *Kurzrok* as allegedly disclosing certain additional elements recited in these dependent claims. However, as shown above, *Muret* fails to disclose, teach, or suggest each and every limitation recited in any of independent Claims 1, 12, and 23. Appellants respectfully submit that these inadequacies of *Muret* are not remedied by the proposed combination of *Muret* with *Kurzrok.*

Kurzrok discloses a system for collecting ratings from a reader of certain content on a web site. (Column 1, Lines 54-61). The system of *Kurzrok* compiles these ratings in a database. (Column 3, Lines 25-27). When a request for a rating summary is received, a rating for the content is calculated and the data is sent to the requester. (Column 4, Lines 23-63). *Kurzrok* does not disclose how the request for a rating summary is generated or what, if any, relationship exists between a web site "reader" and the rating summary "requester." Accordingly, *Kurzrok* necessarily does not disclose, teach, or suggest that the web site reader requests a rating summary for the content that the web site reader has read or viewed.

Kurzrok also necessarily does not disclose that the rating summary requester reads or views the content that is the subject of the rating summary.

The Examiner states, "Kurzrok's method is for content providers to retrieve rating summaries [and] it is common knowledge that a content provider would have viewed their content." (Final Office Action, Page 35). However, even if the Examiner's statement were correct, which applicants do not concede, whether a content provider had at some previous point in time viewed something does not disclose, teach, or suggest software associated with a particular web page operable to "receive, from a website owner who has accessed the particular web page using a web browser ***while the particular web page is viewable within a browser window of the web browser***, input indicating a desire to access the collected information concerning user interaction with the particular web page," as recited in Claim 1.

Thus, as with *Muret, Kurzrok* fails to disclose, teach, or suggest at least software "associated with the particular web page" such that, as recited in Claim 1, it is operable to:

(1) "receive, from a website owner who has accessed the particular web page using a web browser while the particular web page is viewable within a browser window of the web browser, input indicating a desire to access the collected information concerning user interaction with the particular web page;" and

(2) "present the viewable user interface to the website owner in substantially real-time in response to the input received from the website owner while the particular web page was viewable within the browser window of the web browser."

Therefore, even if *Muret* could properly be combined with *Kurzrok* as the Examiner proposes, which Appellants do not concede, this combination would still fail to disclose, teach, or suggest each and every limitation recited in independent Claim 1, from which dependent Claims 6-9 depend. Dependent Claims 6-9 are allowable for at least these reasons and Claims 17-20 and 28-31 are allowable for substantially similar reasons.

For at least these reasons, Appellants respectfully request that the Board reverse the Examiner's rejection of Claims 6-9, 17-20 and 28-31.

Conclusion

Appellants have demonstrated that the present invention, as claimed, is clearly distinguishable over the prior art cited by the Examiner and that the Examiner's rejection of Claims 1-34 is improper. Therefore, Appellants respectfully request the Board to reverse the Examiner's rejection and to instruct the Examiner to issue a notice of allowance as to all pending claims.

Appellants have enclosed a check in the amount of $250.00 for this Appeal Brief. Appellant believes no additional fees are due. The Commission is hereby authorized to charge any additional fee or credit any overpayment to Deposit Account No. 02-0384 of Baker Botts L.L.P.

Respectfully submitted,

BAKER BOTTS L.L.P.
Attorneys for Appellants

Christopher W. Kennerly
Reg. No. 40,675

Date: 4/4/07

CORRESPONDENCE ADDRESS:

Customer No. **05073**

Appendix A: Claims on Appeal

1. (Previously Presented) A system for providing substantially real-time access to collected information concerning user interaction with a particular web page of a website, the system comprising:

first software associated with a particular web page of a website and operable to collect information concerning user interaction with the particular web page; and

second software associated with the particular web page operable to:

receive, from a website owner who has accessed the particular web page using a web browser while the particular web page is viewable within a browser window of the web browser, input indicating a desire to access the collected information concerning user interaction with the particular web page;

determine whether the website owner is authorized to access the collected information concerning user interaction with the particular web page; and

if the website owner is authorized to access the collected information concerning user interaction with the particular web page:

generate a viewable user interface providing substantially real-time access to the collected information concerning user interaction with the particular web page; and

to provide the website owner substantially real-time access to the collected information concerning user interaction with the particular web page, present the viewable user interface to the website owner in substantially real-time in response to the input received from the website owner while the particular web page was viewable within the browser window of the web browser.

2. (Previously Presented) The system of Claim 1, wherein the second software is operable to:

receive a password from the website owner; and

to determine whether the website owner is authorized to access the collected information concerning user interaction with the particular web page, determine whether the password received from the website owner is valid.

3. (Previously Presented) The system of Claim 1, wherein the second software is operable to:

receive, from the website owner, one or more specified filter criteria applicable to the collected information concerning user interaction with the particular web page; and

filter the collected information concerning user interaction with the particular web page according to the specified filter criteria such that the website owner is presented only particular collected information concerning user interaction with the particular web page matching the specified filter criteria.

4. (Previously Presented) The system of Claim 3, wherein at least one of the filter criteria comprises a time frame associated with the collected information concerning user interaction with the particular web page.

5. (Previously Presented) The system of Claim 1, wherein the collected information concerning user interaction with the particular web page is user traffic information.

6. (Previously Presented) The system of Claim 1, wherein the collected information concerning user interaction with the particular web page is user feedback information concerning the particular web page.

7. (Previously Presented) The system of Claim 6, wherein the second software is operable, if the website owner is authorized to access the collected user feedback information, to:

generate a report of the collected user feedback information; and

present the report to the website owner to provide the website owner access to the collected user feedback information while the particular web page is viewable within the browser window of the web browser.

8. (Original) The system of Claim 7, wherein the report comprises one or more of:

a first display of a time frame associated with the collected user feedback information;

a second display providing an overview of the collected user feedback information; and

a third display of one or more sliding bars that each correspond to a particular type of collected user feedback information and indicate percentages of negative, neutral, and positive user feedback information of the corresponding particular type of collected user feedback information.

9. (Previously Presented) The system of Claim 7, wherein the report comprises a display window operable to display one or more of:

one or more charts of one or more general or specific user ratings of the particular web page;

user comments regarding the particular web page; and

one or more survey displays of user answers to one or more explicit questions regarding the particular web page.

10. (Previously Presented) The system of Claim 1, wherein the input indicating a desire to access the collected information concerning user interaction with the particular web page comprises entry of one or more particular keystrokes using a keyboard.

11. (Previously Presented) The system of Claim 1, wherein:

the particular web page comprises a first web page;

the website comprises one or more other web pages in addition to the first web page; and

the second software is further operable to:

receive, from the website owner, a specification of one or more of the other web pages; and

provide the website owner access from the first web page to collected information concerning user interaction with the specified other web pages in addition to the collected information concerning user interaction with the first web page.

12. (Previously Presented) A method for providing substantially real-time access to collected information concerning user interaction with a particular web page of a website, the method comprising:

collecting information concerning user interaction with a particular web page of a website;

receiving, from a website owner who has accessed the particular web page using a web browser while the particular web page is viewable within a browser window of the web browser, input indicating a desire to access the collected information concerning user interaction with the particular web page;

determining whether the website owner is authorized to access the collected information concerning user interaction with the particular web page; and

if the website owner is authorized to access the collected information concerning user interaction with the particular web page:

generating a viewable user interface providing substantially real-time access to the collected information concerning user interaction with the particular web page; and

to provide the website owner substantially real-time access to the collected information concerning user interaction with the particular web page, presenting the viewable user interface to the website owner in substantially real-time in response to the input received from the website owner while the particular web page was viewable within the browser window of the web browser.

13. (Previously Presented) The method of Claim 12, comprising:

receiving a password from the website owner; and

to determine whether the website owner is authorized to access the collected information concerning user interaction with the particular web page, determining whether the password received from the website owner is valid.

14. (Previously Presented) The method of Claim 12, comprising:

receiving, from the website owner, one or more specified filter criteria applicable to the collected information concerning user interaction with the particular web page; and

filtering the collected information concerning user interaction with the particular web page according to the specified filter criteria such that the website owner is presented only particular collected information concerning user interaction with the particular web page matching the specified filter criteria.

15. (Previously Presented) The method of Claim 14, wherein at least one of the filter criteria comprises a time frame associated with the collected information concerning user interaction with the particular web page.

16. (Previously Presented) The method of Claim 12, wherein the collected information concerning user interaction with the particular web page is user traffic information.

17. (Previously Presented) The method of Claim 12, wherein the collected information concerning user interaction with the particular web page is user feedback information concerning the particular web page.

18. (Previously Presented) The method of Claim 17, comprising, if the website owner is authorized to access the collected user feedback information:

generating a report of the collected user feedback information; and

presenting the report to the website owner to provide the website owner access to the collected user feedback information while the particular web page is viewable within the browser window of the web browser.

19. (Original) The method of Claim 18, wherein the report comprises one or more of:

a first display of a time frame associated with the collected user feedback information;

a second display providing an overview of the collected user feedback information; and

a third display of one or more sliding bars that each correspond to a particular type of collected user feedback information and indicate percentages of negative, neutral, and positive user feedback information of the corresponding particular type of collected user feedback information.

20. (Previously Presented) The method of Claim 18, wherein the report comprises a display window operable to display one or more of:

one or more charts of one or more general or specific user ratings of the particular web page;

user comments regarding the particular web page; and

one or more survey displays of user answers to one or more explicit questions regarding the particular web page.

21. (Previously Presented) The method of Claim 12, wherein the input indicating a desire to access the collected information concerning user interaction with the particular web page comprises entry of one or more particular keystrokes using a keyboard.

22. (Previously Presented) The method of Claim 12, wherein:

the particular web page comprises a first web page; and

the website comprises one or more other web pages in addition to the first web page;

the method comprising:

receiving, from the website owner, a specification of one or more of the other web pages; and

providing the website owner access from the first web page to collected information concerning user interaction with the specified other web pages in addition to the collected information concerning user interaction with the first web page.

23. (Previously Presented) Software for providing substantially real-time access to collected information concerning user interaction with a particular web page of a website while the particular web page is viewable, the software embodied in media and when executed operable to:

receive, from a website owner who has accessed a particular web page of a website and using a web browser while the particular web page is viewable within a browser window of the web browser, input indicating a desire to access collected information concerning user interaction with the particular web page;

determine whether the website owner is authorized to access the collected information concerning user interaction with the particular web page; and

if the website owner is authorized to access the collected information concerning user interaction with the particular web page:

generate a viewable user interface providing substantially real-time access to the collected information concerning user interaction with the particular web page; and

to provide the website owner substantially real-time access to the collected information concerning user interaction with the particular web page, present the viewable user interface to the website owner in substantially real-time in response to the input received from the website owner while the particular web page was viewable within the browser window of the web browser.

24. (Previously Presented) The software of Claim 23, operable to:

receive a password from the website owner; and

to determine whether the website owner is authorized to access the collected information concerning user interaction with the particular web page, determine whether the password received from the website owner is valid.

25. (Previously Presented) The software of Claim 23, operable to:

receive, from the website owner, one or more specified filter criteria applicable to the collected information concerning user interaction with the particular web page; and

filter the collected information concerning user interaction with the particular web page according to the specified filter criteria such that the website owner is presented only particular collected information concerning user interaction with the particular web page matching the specified filter criteria.

26. (Previously Presented) The software of Claim 25, wherein at least one of the filter criteria comprises a time frame associated with the collected information concerning user interaction with the particular web page.

27. (Previously Presented) The software of Claim 23, wherein the collected information concerning user interaction with the particular web page is user traffic information.

28. (Previously Presented) The software of Claim 23, wherein the collected information concerning user interaction with the particular web page is user feedback information concerning the particular web page.

29. (Previously Presented) The software of Claim 28, operable, if the website owner is authorized to access the collected user feedback information, to:

generate a report of the collected user feedback information; and

present the report to the website owner to provide the website owner access to the collected user feedback information while the particular web page is viewable within the browser window of the web browser.

30. (Original) The software of Claim 29, wherein the report comprises one or more of:

a first display of a time frame associated with the collected user feedback information;

a second display providing an overview of the collected user feedback information; and

a third display of one or more sliding bars that each correspond to a particular type of collected user feedback information and indicate percentages of negative, neutral, and positive user feedback information of the corresponding particular type of collected user feedback information.

31. (Previously Presented) The software of Claim 29, wherein the report comprises a display window operable to display one or more of:

one or more charts of one or more general or specific user ratings of the particular web page;

user comments regarding the particular web page; and

one or more survey displays of user answers to one or more explicit questions regarding the particular web page.

32. (Previously Presented) The software of Claim 23, wherein the input indicating a desire to access the collected information concerning user interaction with the particular web page comprises entry of one or more particular keystrokes using a keyboard.

33. (Previously Presented) The software of Claim 23, wherein:

the particular web page comprises a first web page; and

the website comprises one or more other web pages in addition to the first web page;

the software operable to:

receive, from the website owner, a specification of one or more of the other web pages; and

provide the website owner access from the first web page to collected information concerning user interaction with the specified other web pages in addition to the collected information concerning user interaction with the first web page.

34. (Previously Presented) A system for providing substantially real-time access to collected information concerning user interaction with a particular web page of a website, the system comprising:

means for collecting information concerning user interaction with a particular web page of a website; and

means for receiving, from a website owner who has accessed the particular web page using a web browser and while the particular web page is viewable within a browser window of the web browser, input indicating a desire to access the collected information concerning user interaction with the particular web page;

means for determining whether the website owner is authorized to access the collected information concerning user interaction with the particular web page; and

means for, if the website owner is authorized to access the collected information concerning user interaction with the particular web page:

generating a viewable user interface providing substantially real-time access to the collected information concerning user interaction with the particular web page; and

to provide the website owner substantially real-time access to the collected information concerning user interaction with the particular web page, presenting the viewable user interface to the website owner in substantially real-time in response to the input received from the website owner while the particular web page is viewable within the browser window of the web browser.

Appendix B: Evidence

US006792458B1

(12) **United States Patent**
Muret et al.

(10) **Patent No.: US 6,792,458 B1**
(45) **Date of Patent: Sep. 14, 2004**

(54) **SYSTEM AND METHOD FOR MONITORING AND ANALYZING INTERNET TRAFFIC**

(75) Inventors: **Paul Nicolas Muret**, San Diego, CA (US); **Hui Sok Moon**, La Jolla, CA (US)

(73) Assignee: **Urchin Software Corporation**, San Diego, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 642 days.

(21) Appl. No.: **09/679,297**

(22) Filed: **Oct. 4, 2000**

Related U.S. Application Data

(60) Provisional application No. 60/157,649, filed on Oct. 4, 1999.

(51) **Int. Cl.**[7] **G06F 15/173**

(52) **U.S. Cl.** **709/224**; 709/217; 709/223; 709/226; 709/229

(58) **Field of Search** 709/224, 223, 709/225, 226, 227, 228, 229, 217–19

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,511,190 A		4/1996	Sharma et al.	395/600
5,675,510 A		10/1997	Coffey et al.	364/514
5,689,416 A		11/1997	Shimizu et al.	364/185
5,727,129 A		3/1998	Barrett et al.	395/12
5,732,218 A		3/1998	Bland et al.	395/200.54
5,787,253 A		7/1998	McCreery et al.	
5,796,952 A		8/1998	Davis et al.	395/200.54
5,878,223 A		3/1999	Becker et al.	395/200.53
5,951,642 A		9/1999	Onoe et al.	
6,112,238 A	*	8/2000	Boyd et al.	709/224
6,122,639 A		9/2000	Babu et al.	707/103
6,317,787 B1	*	11/2001	Boyd et al.	709/224
6,662,227 B2	*	12/2003	Boyd et al.	709/224

OTHER PUBLICATIONS

"Urchin™ 2 Installation and Administration Guide for UNIX", Quantified Systems, Inc., pp. 1–1 through 7–2 (Sep. 1, 1999).

"Power to the People", Quantified Systems, Inc. (Sep. 1, 1999).

"Urchin™ ISP 1.4 for UNIX Installation and Administration Guide", Quantified Web Systems, Inc.. pp. 1–1 through 6–5 (Dec. 1, 1997).

Home Web page for Analog logfile analyser (www.analog.cx).

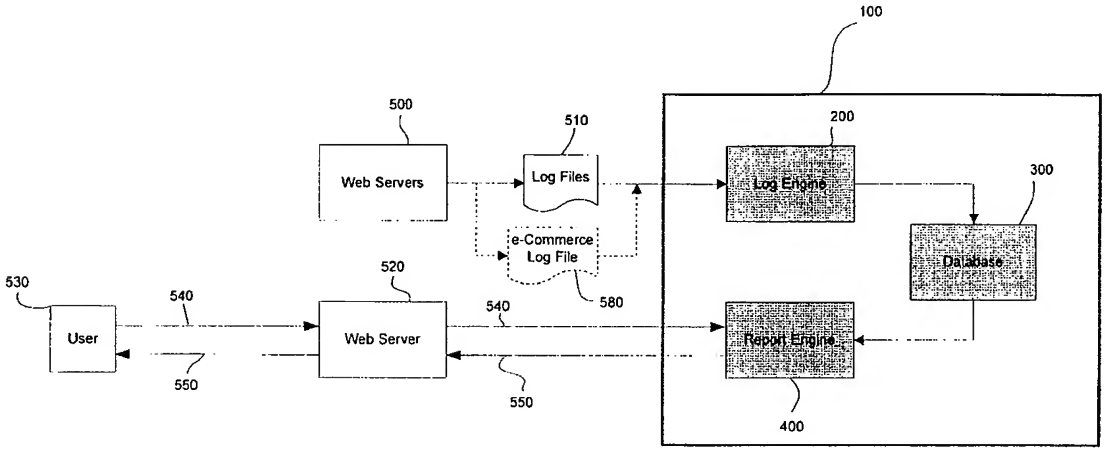
* cited by examiner

Primary Examiner—Ario Etienne
Assistant Examiner—LaShonda Jacobs
(74) *Attorney, Agent, or Firm*—Fleshner & Kim LLP

(57) **ABSTRACT**

A system and method for monitoring and analyzing Internet traffic is provided that is efficient, completely automated, and fast enough to handle the busiest websites on the Internet, processing data many times faster than existing systems. The system and method of the present invention processes data by reading log files produced by web servers, or by interfacing with the web server in real time, processing the data as it occurs. The system and method of the present invention can be applied to one website or thousands of websites, whether they reside on one server or multiple servers. The multi-site and sub-reporting capabilities of the system and method of the present invention makes it applicable to servers containing thousands of websites and entire on-line communities. In one embodiment, the system and method of the present invention includes e-commerce analysis and reporting functionality, in which data from standard traffic logs is received and merged with data from e-commerce systems. The system and method of the present invention can produce reports showing detailed "return on investment" information, including identifying which banner ads, referrals, domains, etc. are producing specific dollars.

79 Claims, 36 Drawing Sheets



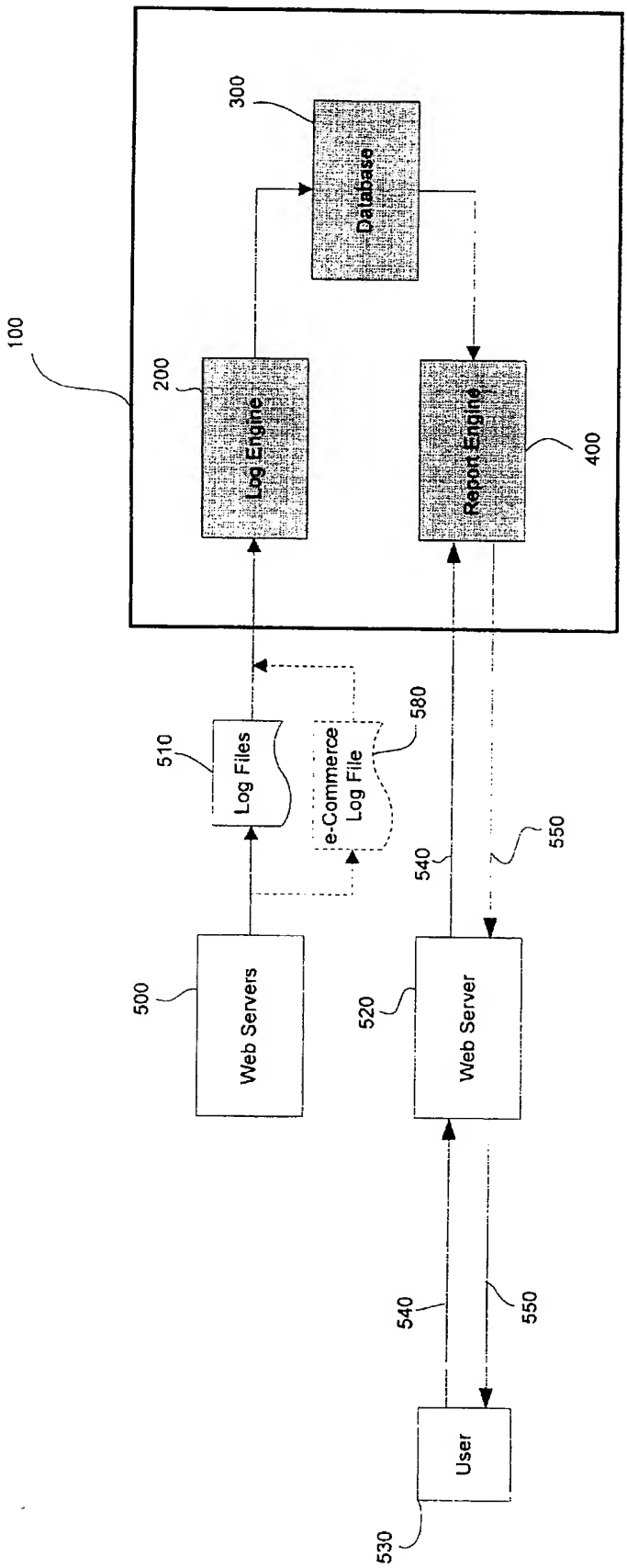
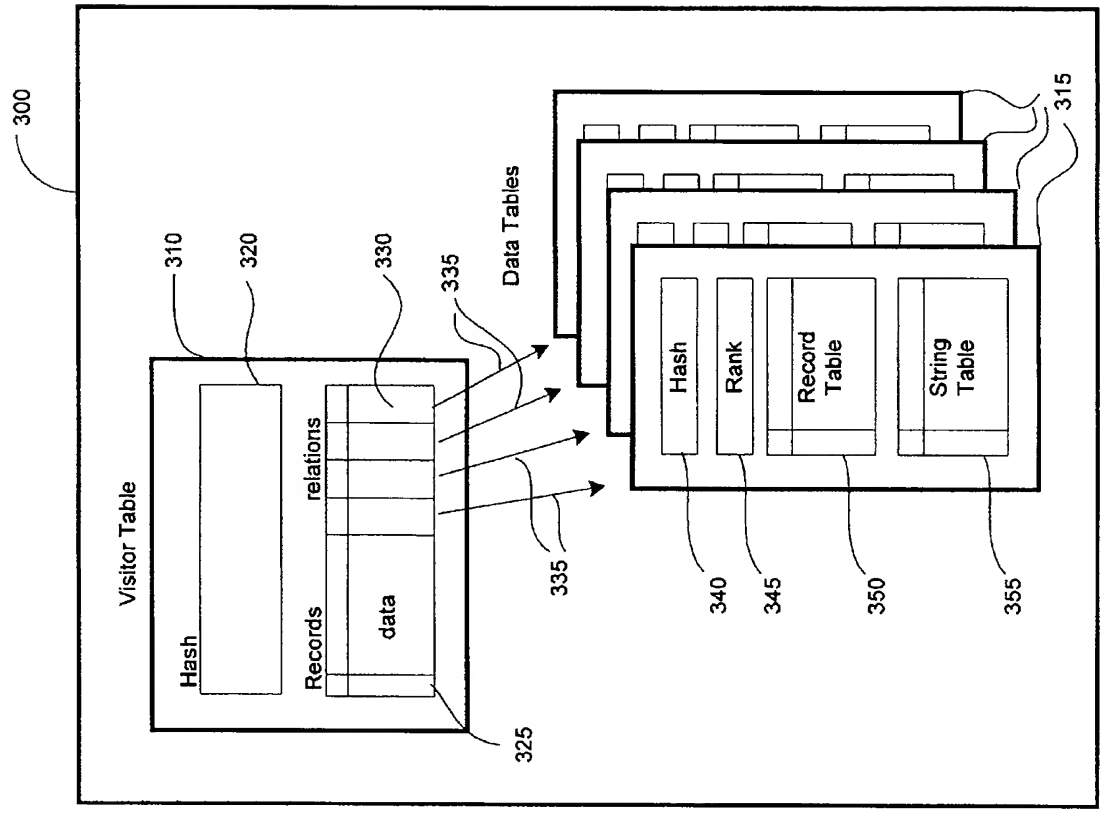

100
200
Log Engine
300
Database
400
Report Engine
510
Log Files
580
e-Commerce Log File
540
550
500
Web Servers
520
Web Server
540
550
530
User

Fig. 1

Fig. 2


300
310
320
330
335
Data Tables
315
Visitor Table
Hash
Records
data
relations
335
325
Hash
Rank
Record Table
String Table
340
345
350
355

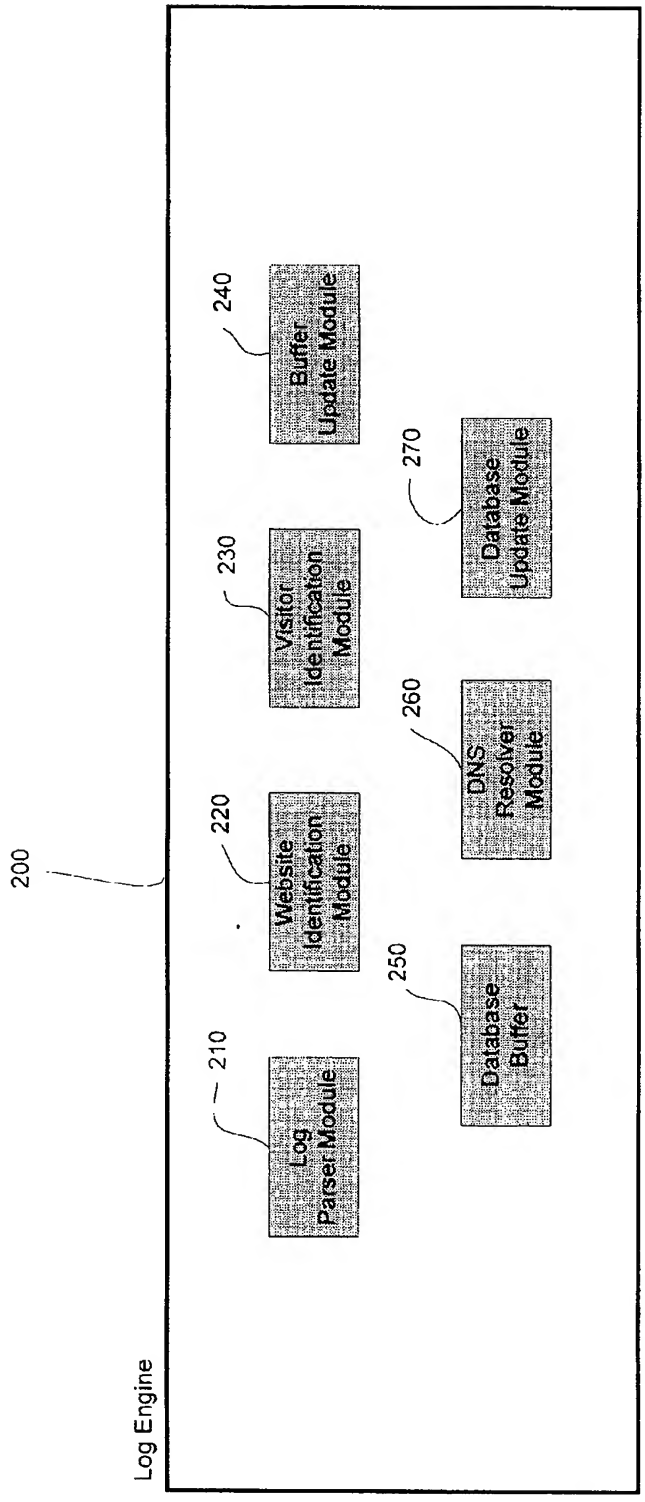

200
Log Engine
210
Log Parser Module
220
Website Identification Module
230
Visitor Identification Module
240
Buffer Update Module
250
Database Buffer
260
DNS Resolver Module
270
Database Update Module

Fig. 3

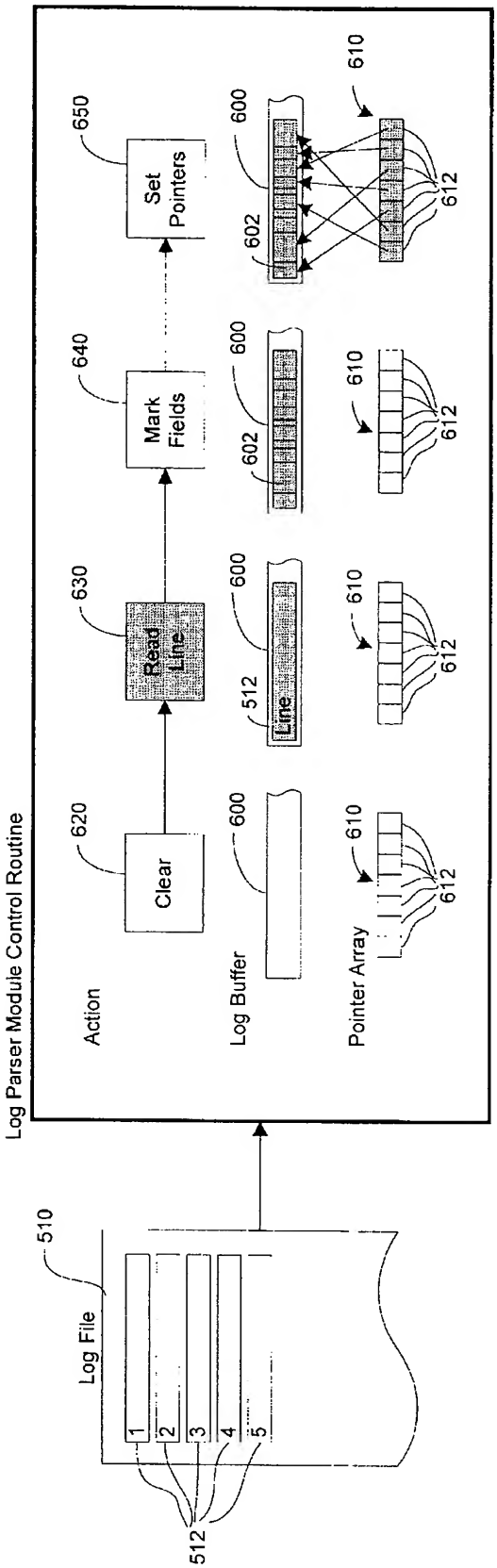

Log Parser Module Control Routine
Action
Log Buffer
Pointer Array
Clear
Read Line
Mark Fields
Set Pointers
620
630
640
650
600
610
612
602
512
Line
Log File
510
1
2
3
4
5

Fig. 4

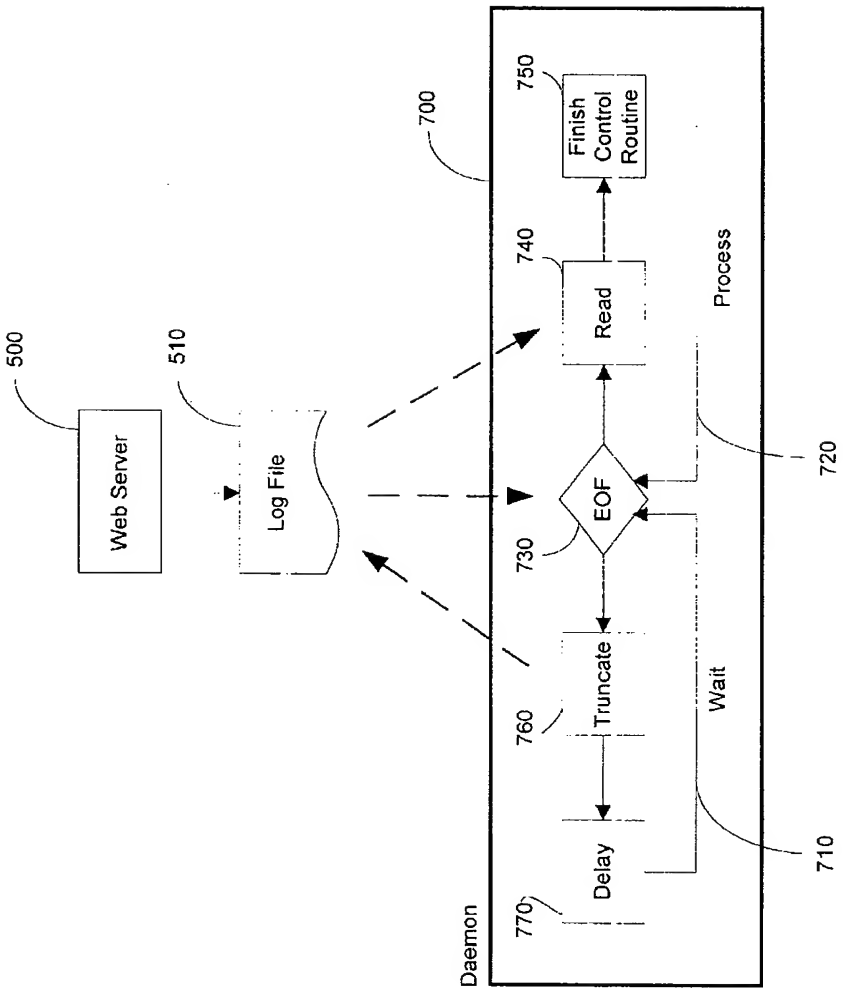

500
Web Server
510
Log File
700
Daemon
750
Finish Control Routine
740
Read
Process
720
730
EOF
760
Truncate
Wait
710
770
Delay

Fig. 5

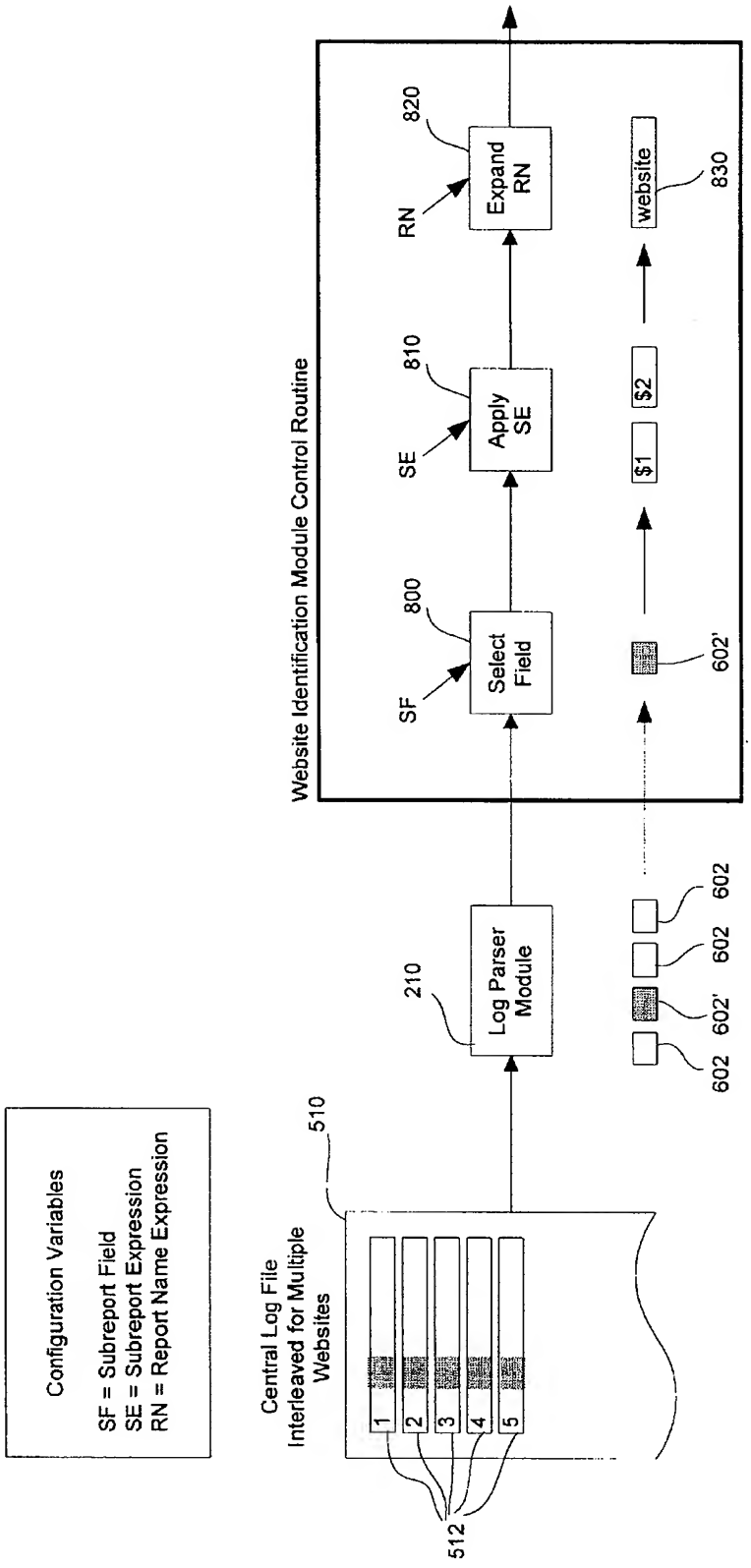

Configuration Variables
SF = Subreport Field
SE = Subreport Expression
RN = Report Name Expression
Central Log File
Interleaved for Multiple
Websites
510
1
2
3
4
5
512
210
Log Parser
Module
602
602'
602
602
Website Identification Module Control Routine
SF
800
Select
Field
602'
SE
810
Apply
SE
$1
$2
RN
820
Expand
RN
website
830

Fig. 6

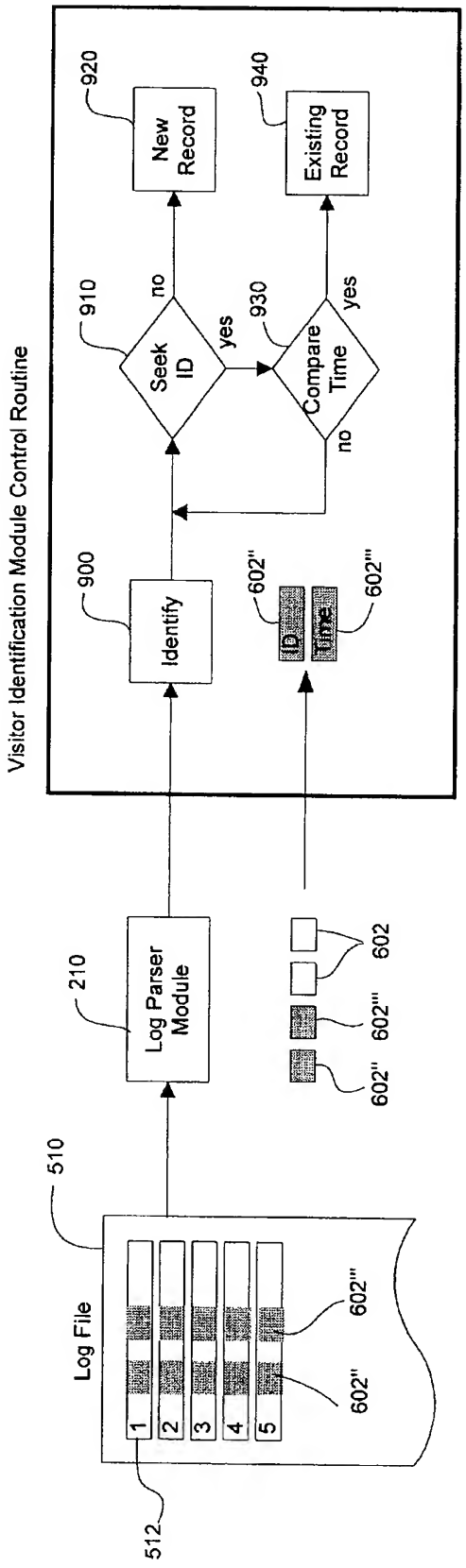

Visitor Identification Module Control Routine
900
Identify
910
Seek ID
no
yes
920
New Record
930
Compare Time
yes
no
940
Existing Record
602"
ID
time
602'''
210
Log Parser Module
602
602'''
602"
510
Log File
1
2
3
4
5
602'''
602"
512

Fig. 7

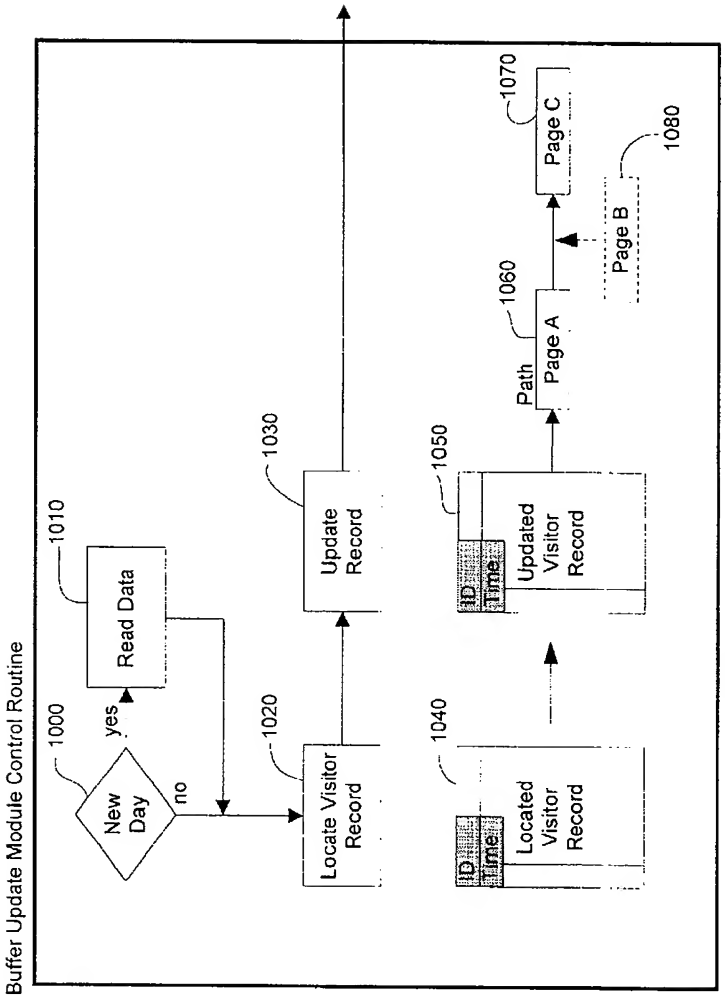

Buffer Update Module Control Routine
1000
New Day
yes
no
1010
Read Data
1020
Locate Visitor Record
1030
Update Record
1040
ID
Time
Located Visitor Record
1050
ID
Time
Updated Visitor Record
1060
Path
Page A
1070
Page C
1080
Page B

Fig. 8

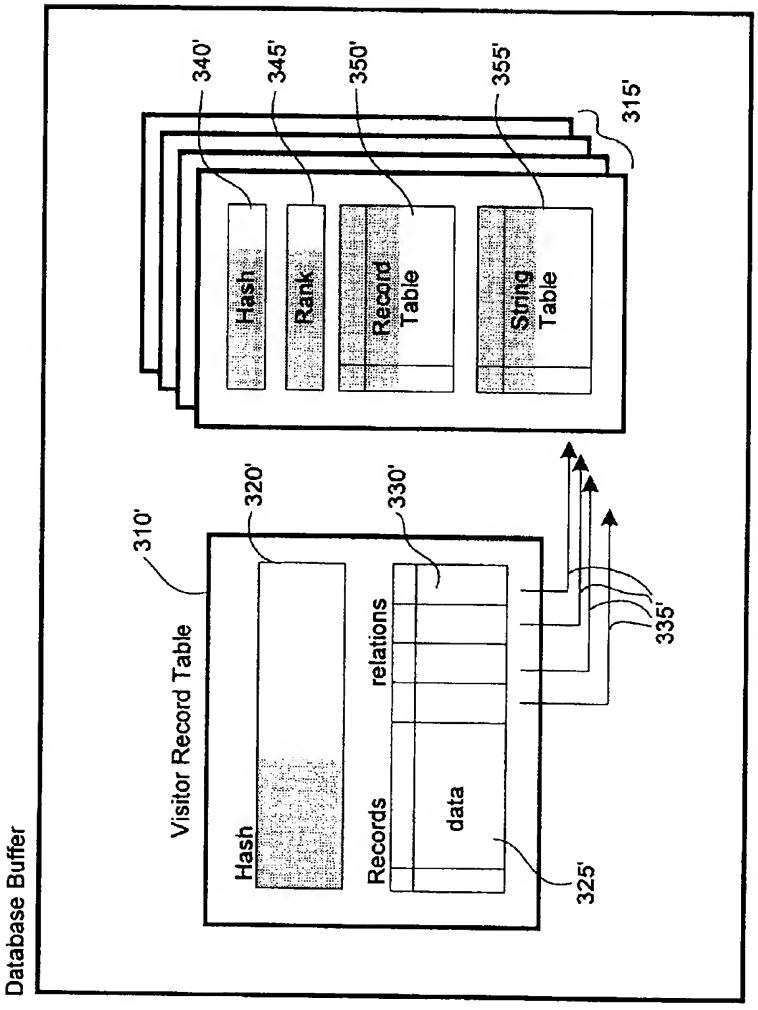

Database Buffer
Visitor Record Table
Hash
Records
data
relations
310'
320'
325'
330'
335'
340'
345'
350'
355'
315'
Hash
Rank
Record Table
String Table

Fig. 9

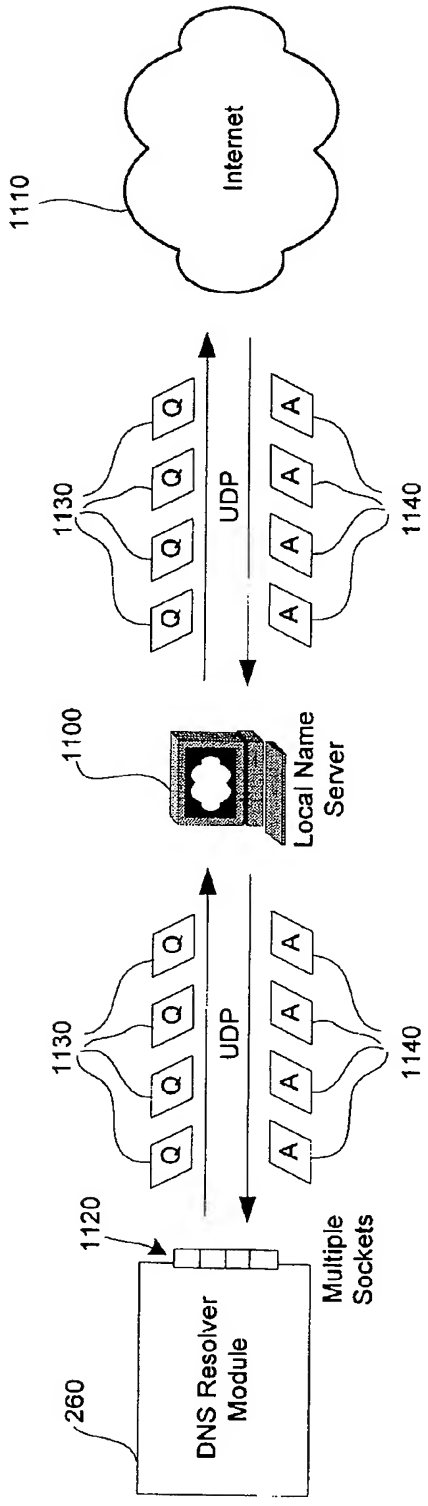

1110
Internet
1130
Q
Q
Q
Q
UDP
A
A
A
A
1140
1100
Local Name Server
1130
Q
Q
Q
Q
UDP
A
A
A
A
1140
1120
Multiple Sockets
260
DNS Resolver Module

Fig. 10

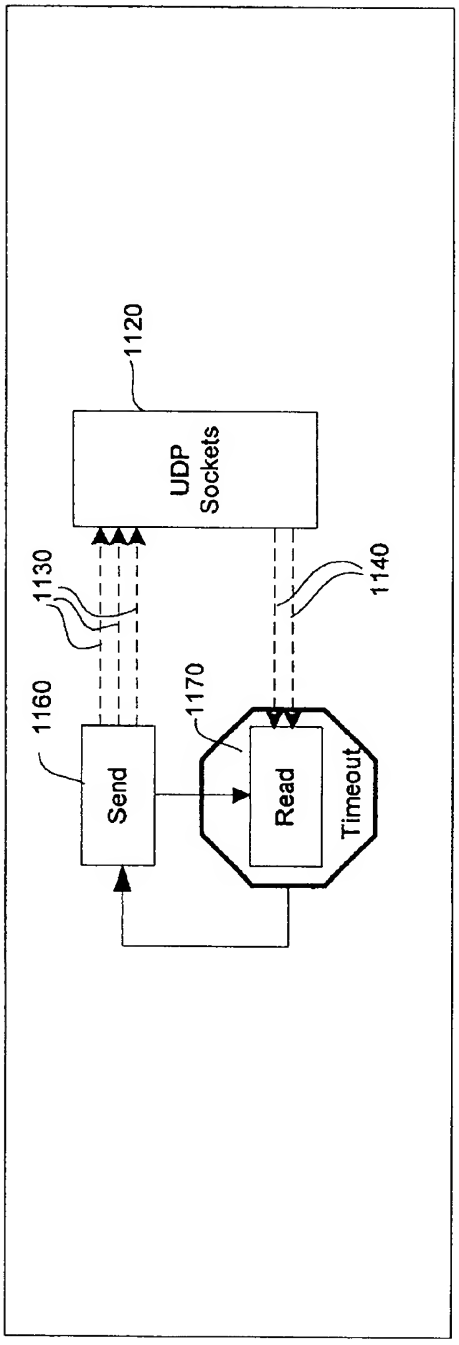


Fig. 11

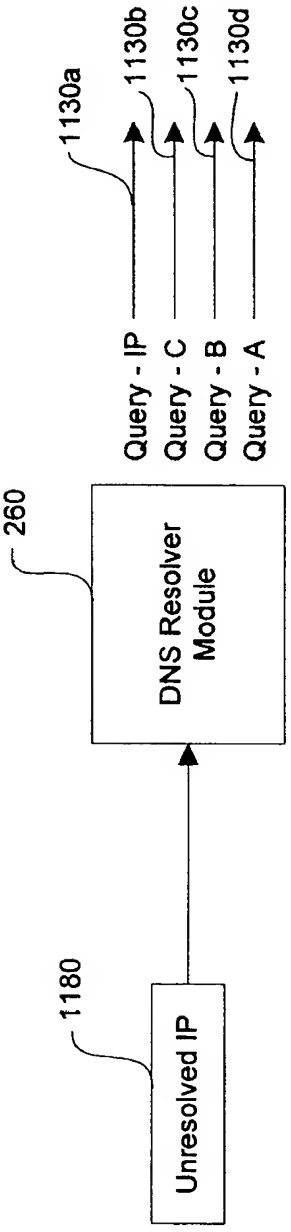
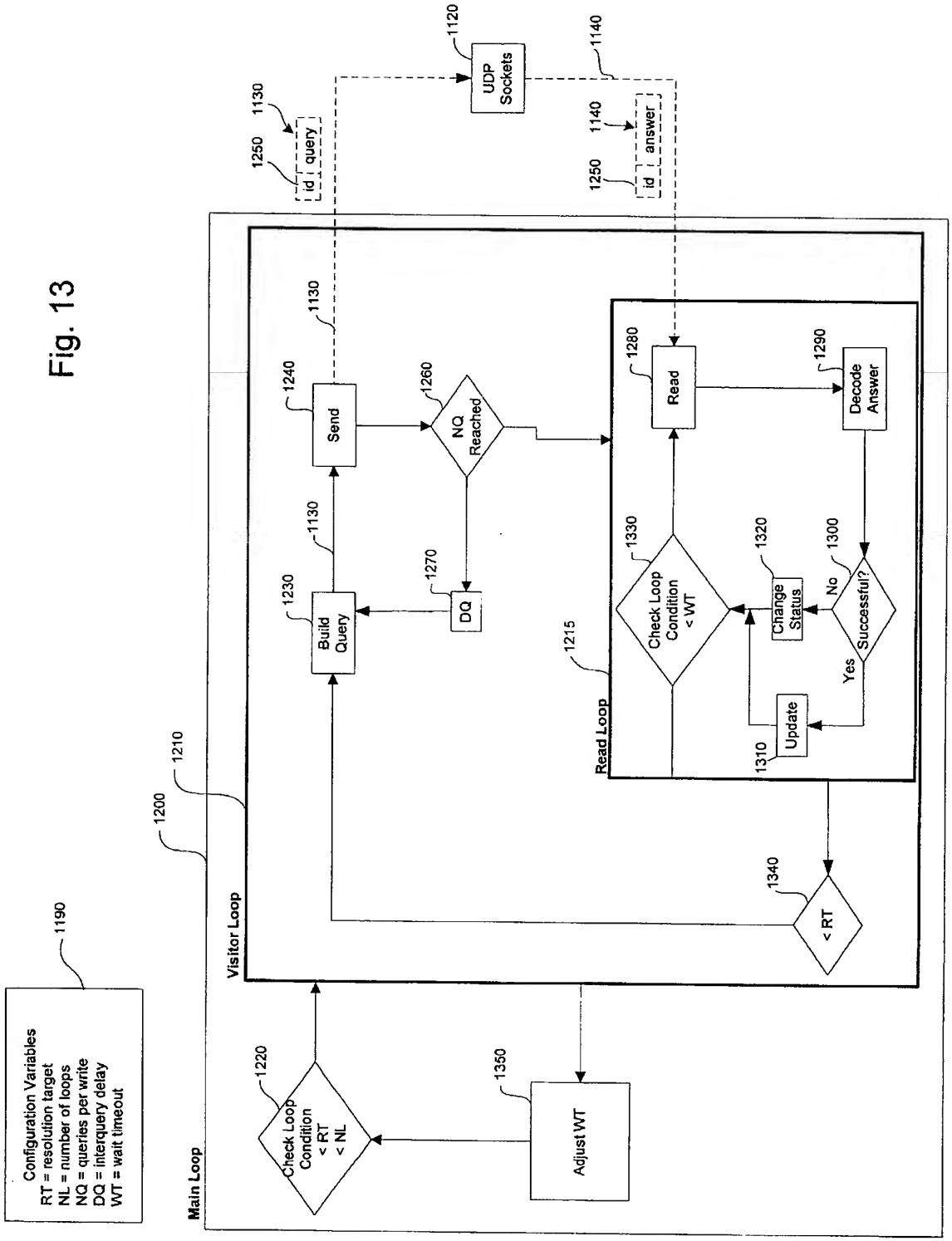

1130a
1130b
1130c
1130d
Query - IP
Query - C
Query - B
Query - A
260
DNS Resolver Module
1180
Unresolved IP

Fig. 12

Fig. 13


Configuration Variables
RT = resolution target
NL = number of loops
NQ = queries per write
DQ = interquery delay
WT = wait timeout
1190
Main Loop
1200
Check Loop Condition < RT < NL
1220
Adjust WT
1350
Visitor Loop
1210
Build Query
1230
DQ
1270
Send
1240
NQ Reached
1260
Read Loop
1215
Check Loop Condition < WT
1330
Read
1280
Decode Answer
1290
Successful?
1300
No
Change Status
1320
Yes
Update
1310
< RT
1340
UDP Sockets
1120
1130
1140
id query
1250
id answer
1250

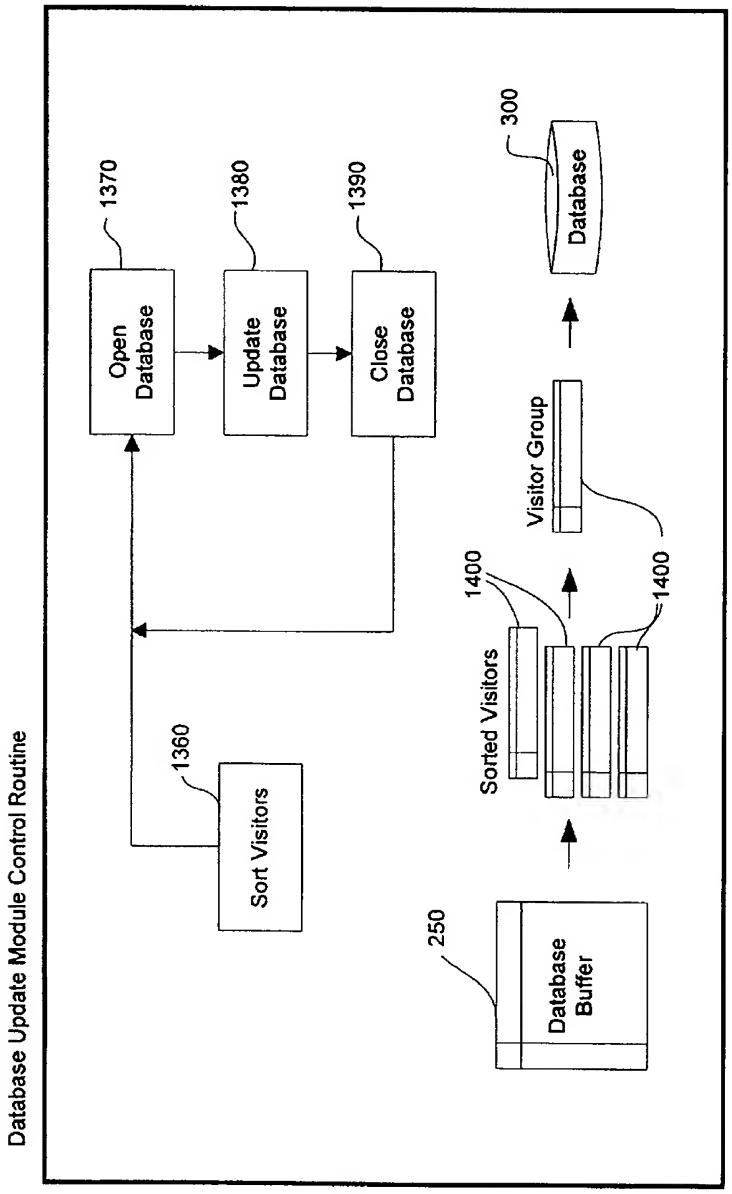

Database Update Module Control Routine
Open Database
1370
Update Database
1380
Close Database
1390
Sort Visitors
1360
Database Buffer
250
Sorted Visitors
1400
1400
Visitor Group
Database
300

Fig. 14

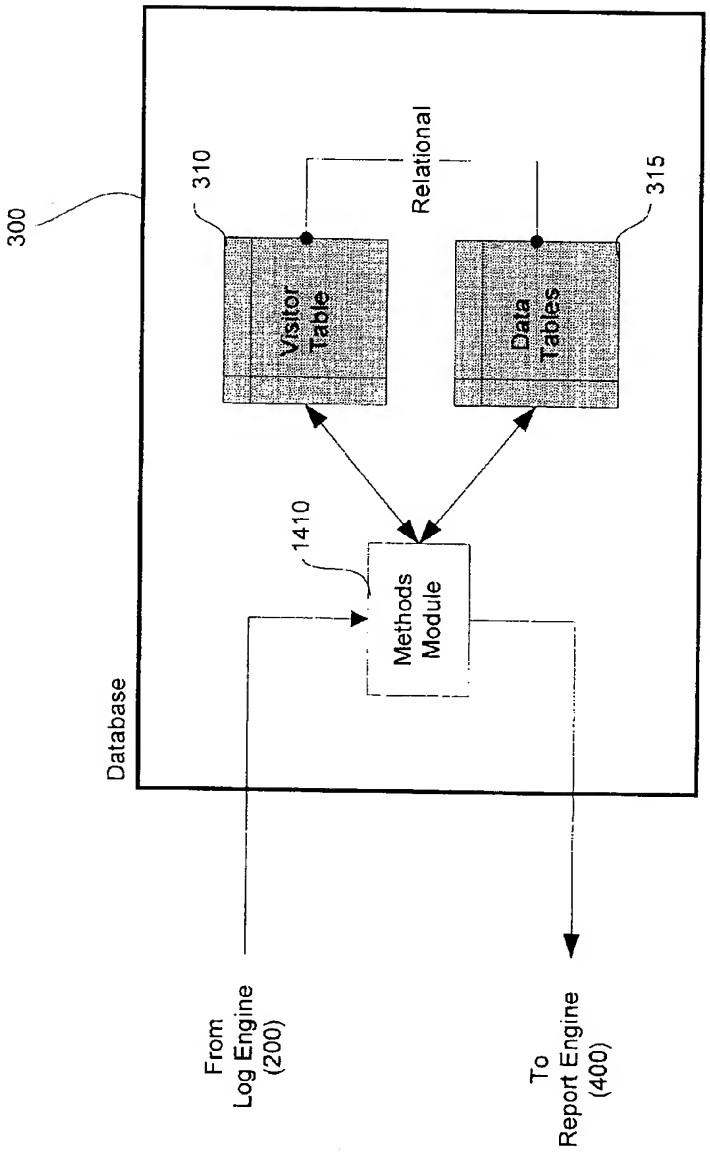

300
310
Relational
315
Visitor Table
Data Tables
1410
Methods Module
Database
From Log Engine (200)
To Report Engine (400)

Fig. 15

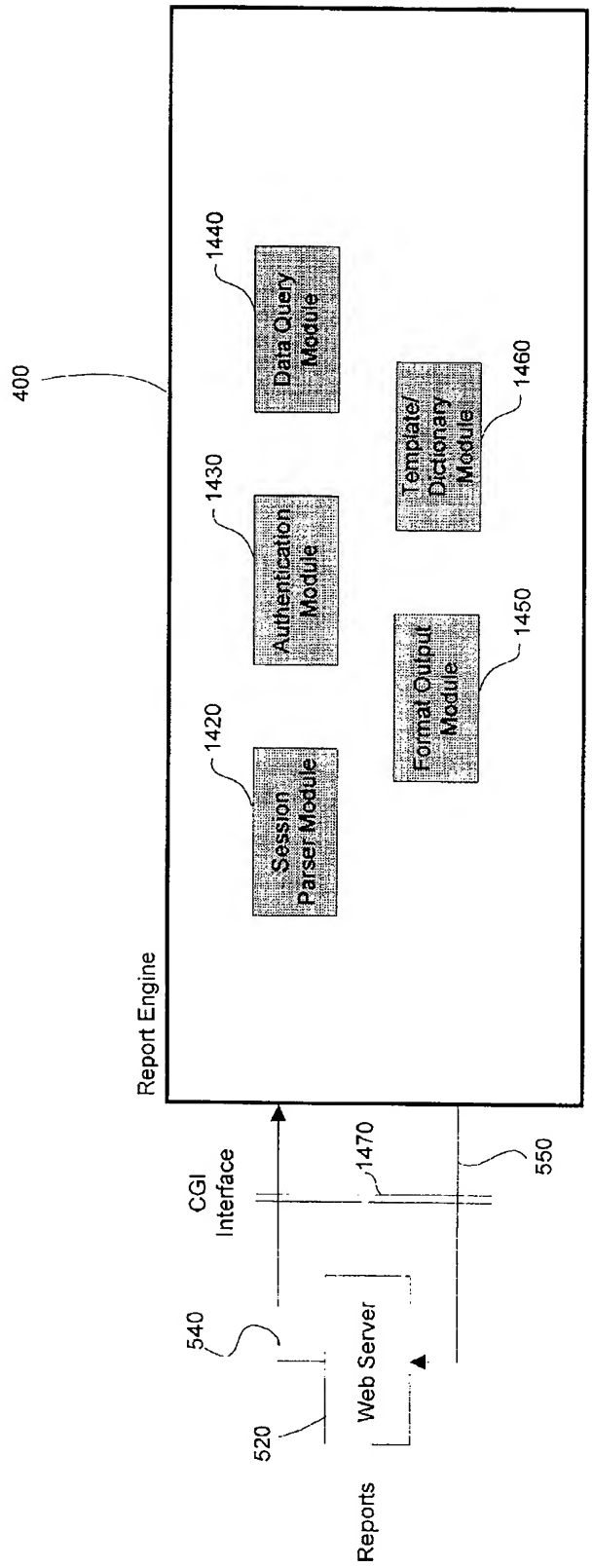

400
Report Engine
Session Parser Module
1420
Authentication Module
1430
Data Query Module
1440
Format Output Module
1450
Template/ Dictionary Module
1460
CGI Interface
1470
550
540
520
Web Server
Reports

Fig. 16

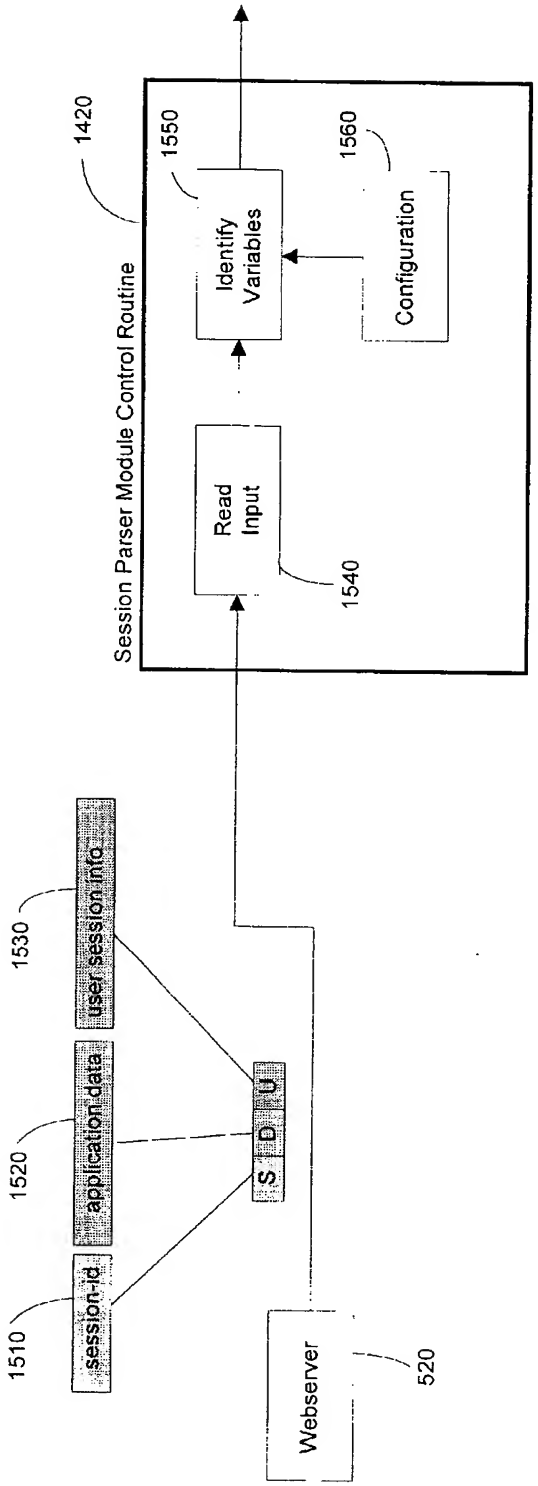

1420
Session Parser Module Control Routine
1550
Identify Variables
1560
Configuration
Read Input
1540
1530
user session info
1520
application data
1510
session-id
S
D
U
Webserver
520

Fig. 17

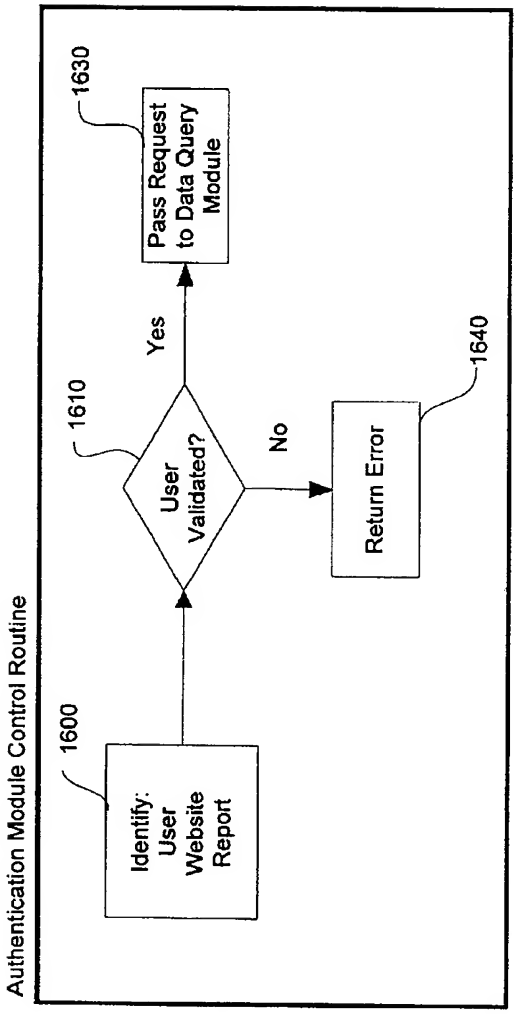

Authentication Module Control Routine
1600
Identify: User Website Report
1610
User Validated?
Yes
No
1630
Pass Request to Data Query Module
1640
Return Error

Fig. 18

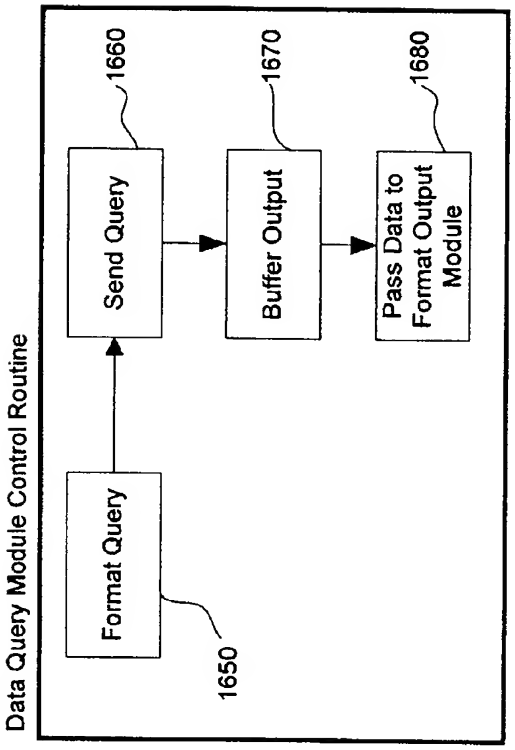

Data Query Module Control Routine
Format Query
1650
Send Query
1660
Buffer Output
1670
Pass Data to Format Output Module
1680

Fig. 19

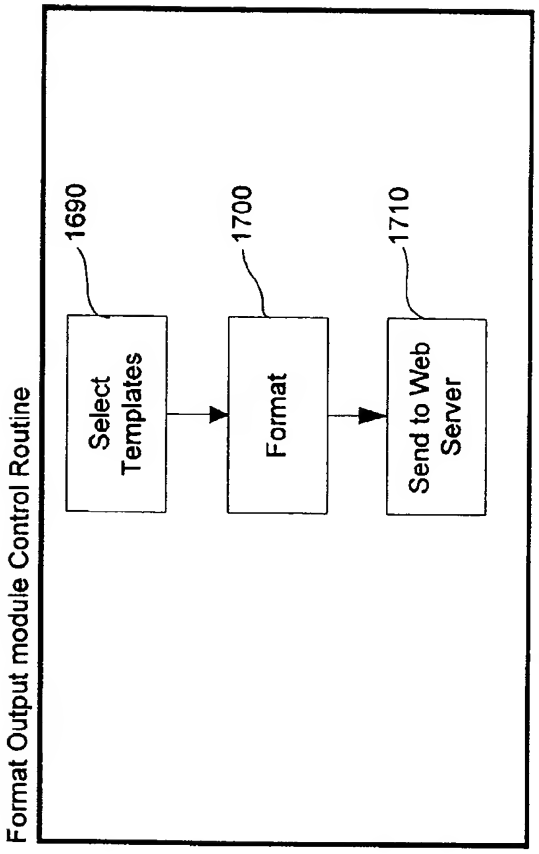

Format Output module Control Routine
1690
Select Templates
1700
Format
1710
Send to Web Server

Fig. 20

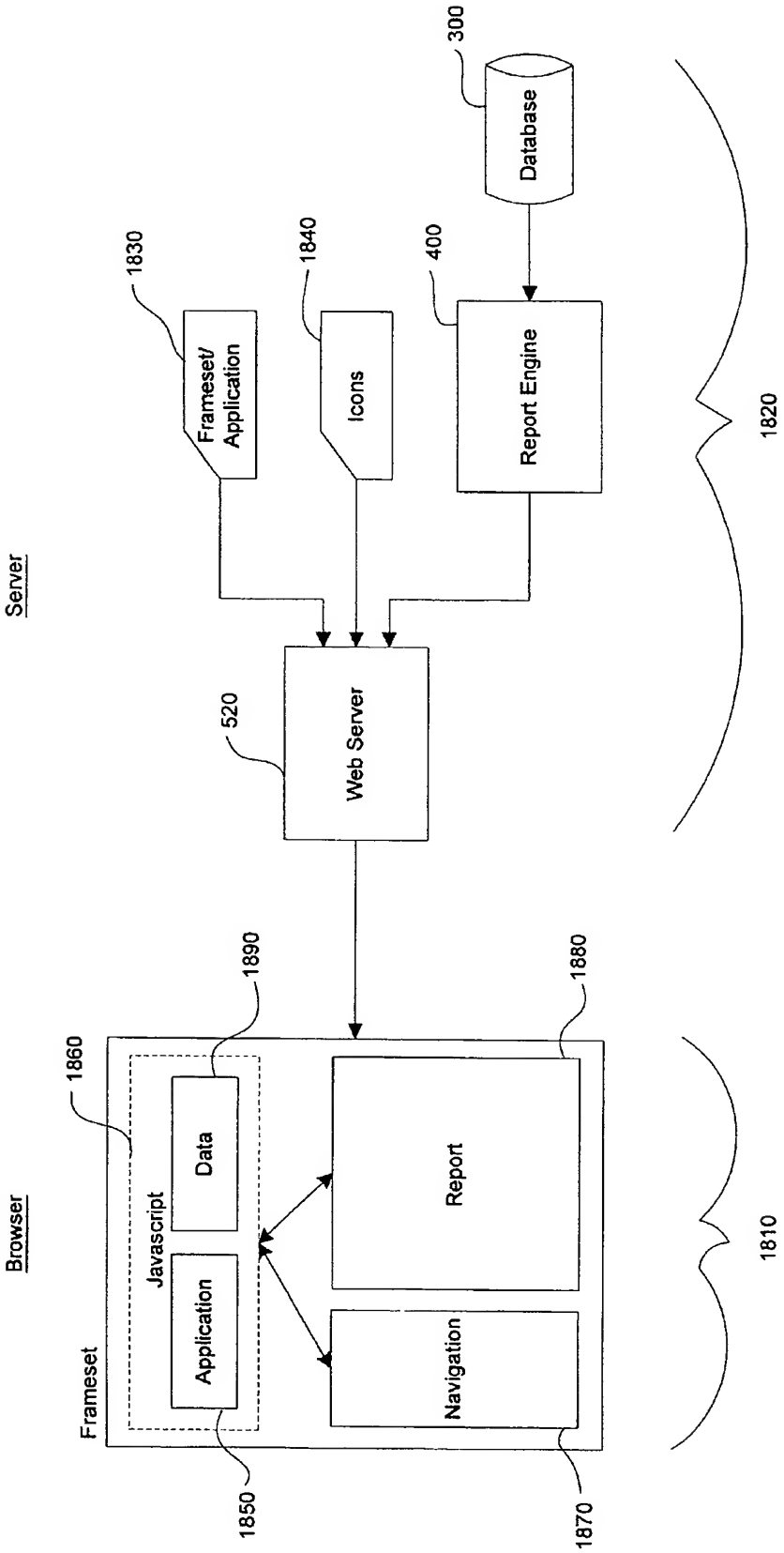

Server
Browser
Database
300
Frameset/ Application
1830
Icons
1840
Report Engine
400
1820
Web Server
520
1890
1880
1860
Data
Javascript
Application
Frameset
Report
Navigation
1850
1870
1810

Fig. 21

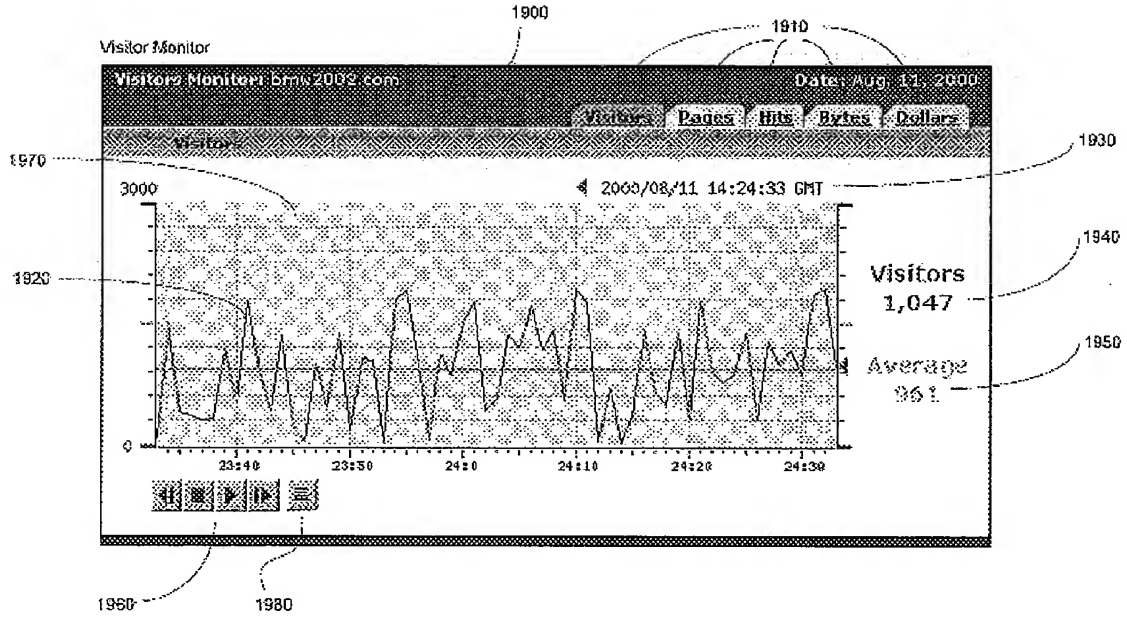

1900
1910
Visitor Monitor
Visitors Monitor: bmis2002.com
Date: Aug 11, 2000
Visitors
Pages
Hits
Bytes
Dollars
1970
1930
3000
2000/08/11 14:24:33 GMT
1940
1920
Visitors
1,047
1950
Average
961
0
23:40
23:50
24:0
24:10
24:20
24:30
1960
1980

Fig. 22

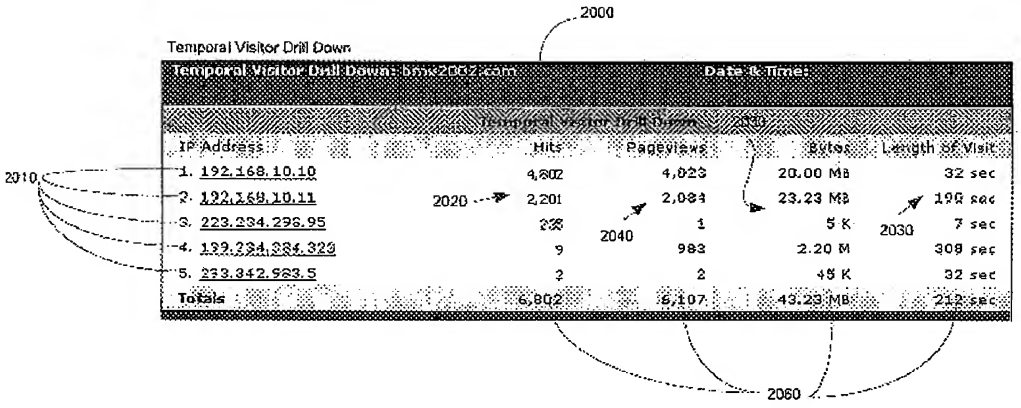

2000
Temporal Visitor Drill Down
Temporal Visitor Drill Down: bmw2002.com
Date & Time:
IP Address
Hits
Pageviews
Bytes
Length of Visit
1. 192.168.10.10
2. 192.168.10.11
3. 223.234.298.95
4. 139.234.384.329
5. 233.342.983.5
Totals
2010
2020
2040
2030
2060

Fig. 23

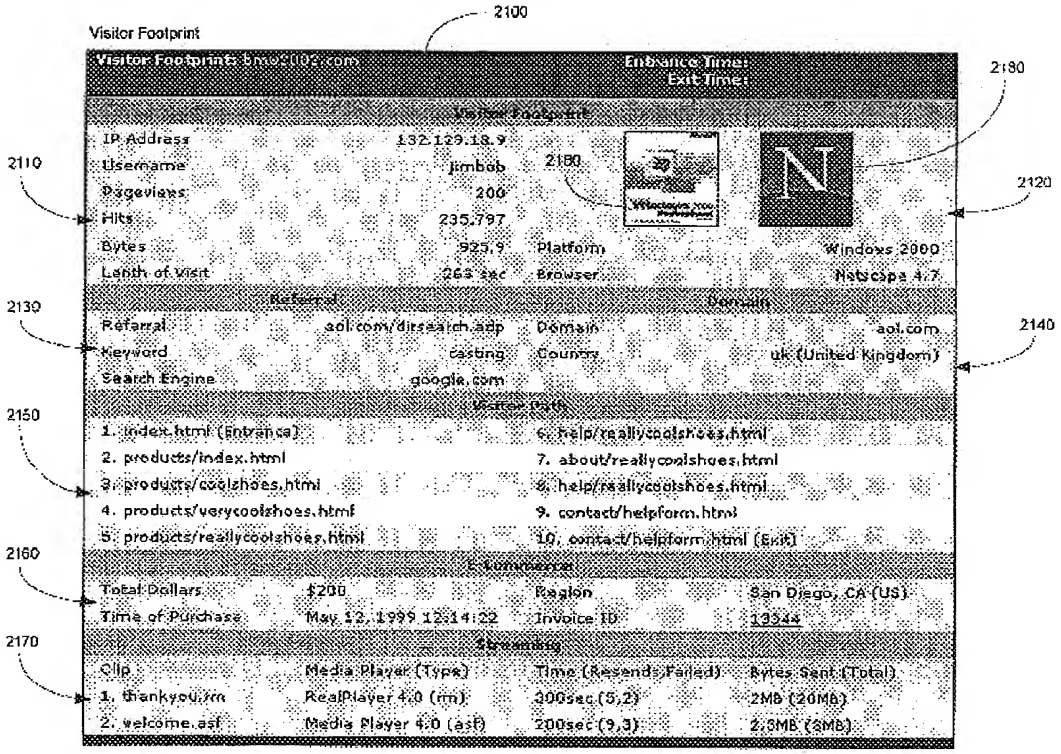

2100
Visitor Footprint
Visitor Footprint: bmo2002.com
Entrance Time:
Exit Time:
2180
Visitor Footprint
IP Address 132.129.18.9
Username jimbob
Pageviews 200
Hits 235,797
Bytes 925.9
Length of Visit 263 sec
2180
Platform Windows 2000
Browser Netscape 4.7
2110
2120
Referral
Referral aol.com/dirsearch.asp
Keyword casting
Search Engine google.com
Domain
Domain aol.com
Country uk (United Kingdom)
2130
2140
Visitor Path
1. index.html (Entrance)
2. products/index.html
3. products/coolzhoes.html
4. products/verycoolzhoes.html
5. products/reallycoolshoes.html
6. help/reallycoolshoes.html
7. about/reallycoolshoes.html
8. help/reallycoolshoes.html
9. contact/helpform.html
10. contact/helpform.html (Exit)
2150
E-Commerce
Total Dollars $200
Time of Purchase May 12, 1999 12:14:22
Region San Diego, CA (US)
Invoice ID 1334x
2160
Streaming
Clip
Media Player (Type)
Time (Resends,Failed)
Bytes Sent (Total)
1. thankyou.rm
RealPlayer 4.0 (rm)
200sec (5,2)
2MB (20MB)
2. welcome.asf
Media Player 4.0 (asf)
200sec (9,3)
2.5MB (3MB)
2170

Fig. 24

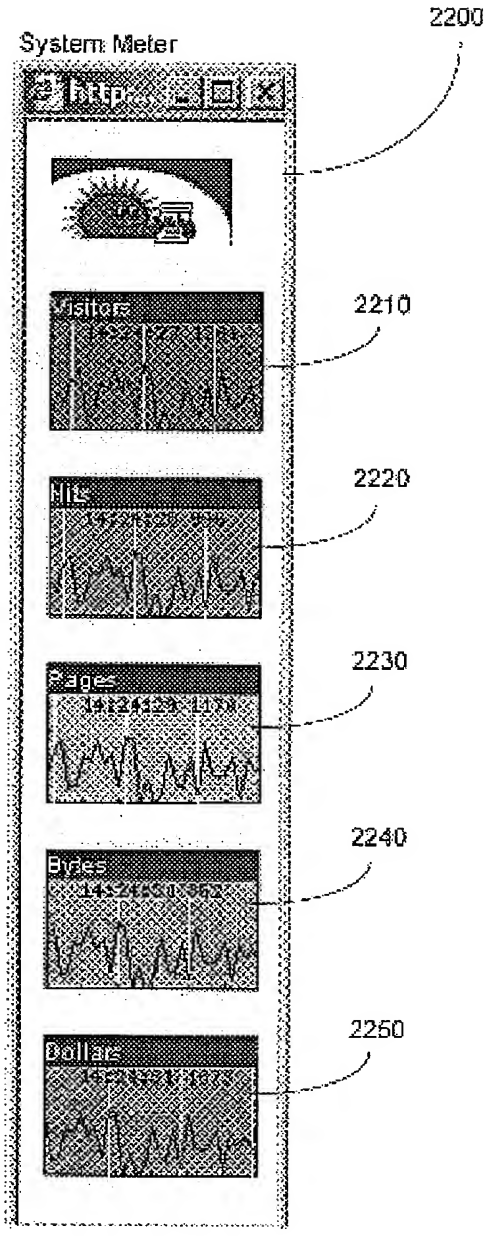

System Meter
Http
Visitors
Hits
Pages
Bytes
Dollars
2200
2210
2220
2230
2240
2250

Fig. 25

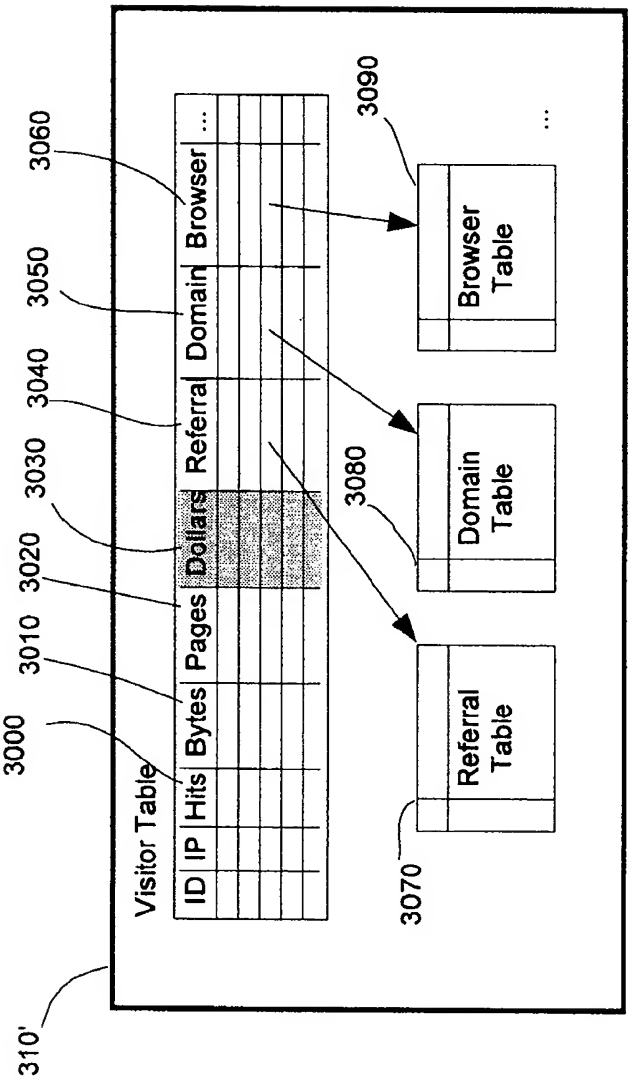

310'
3000
Visitor Table
ID
IP
Hits
Bytes
Pages
Dollars
Referral
Domain
Browser
...
3010
3020
3030
3040
3050
3060
3070
3080
3090
Referral Table
Domain Table
Browser Table
...

Fig. 26

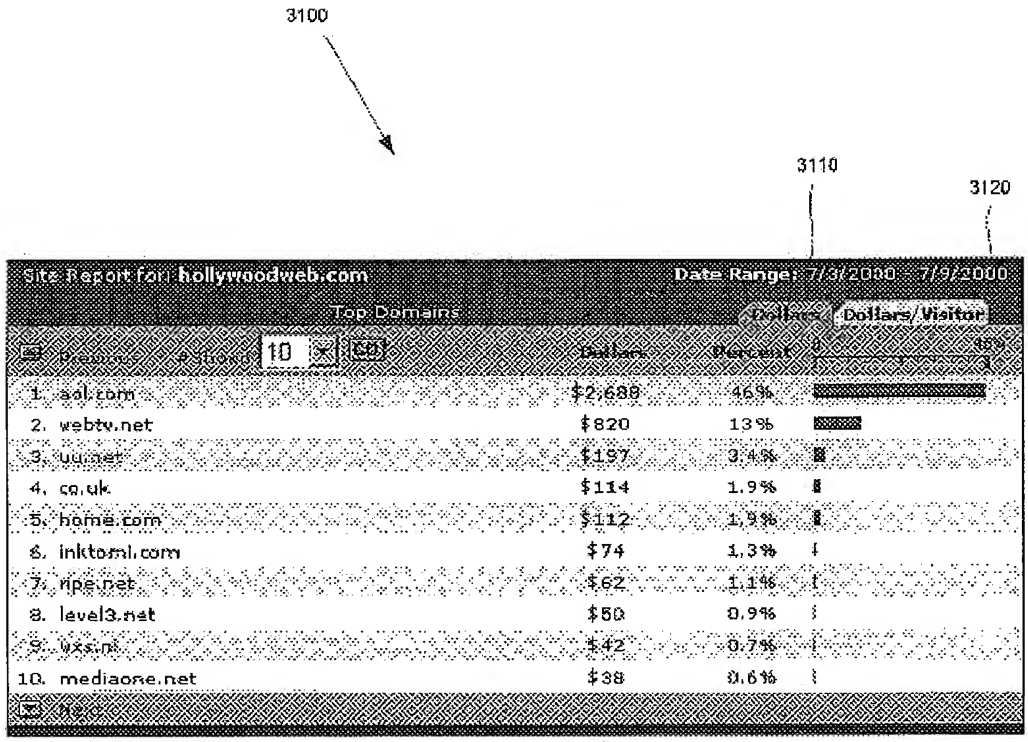

3100
3110
3120
Site Report for: hollywoodweb.com
Date Range: 7/3/2000 - 7/9/2000
Top Domains
Dollars
Dollars/Visitor
Previous
Show 10
Next
Dollars
Percent
0
45%
1. aol.com $2,688 46%
2. webtv.net $820 13%
3. uu.net $197 3.4%
4. co.uk $114 1.9%
5. home.com $112 1.9%
6. inktomi.com $74 1.3%
7. ripe.net $62 1.1%
8. level3.net $50 0.9%
9. wxs.nl $42 0.7%
10. mediaone.net $38 0.6%
Next

Fig. 27

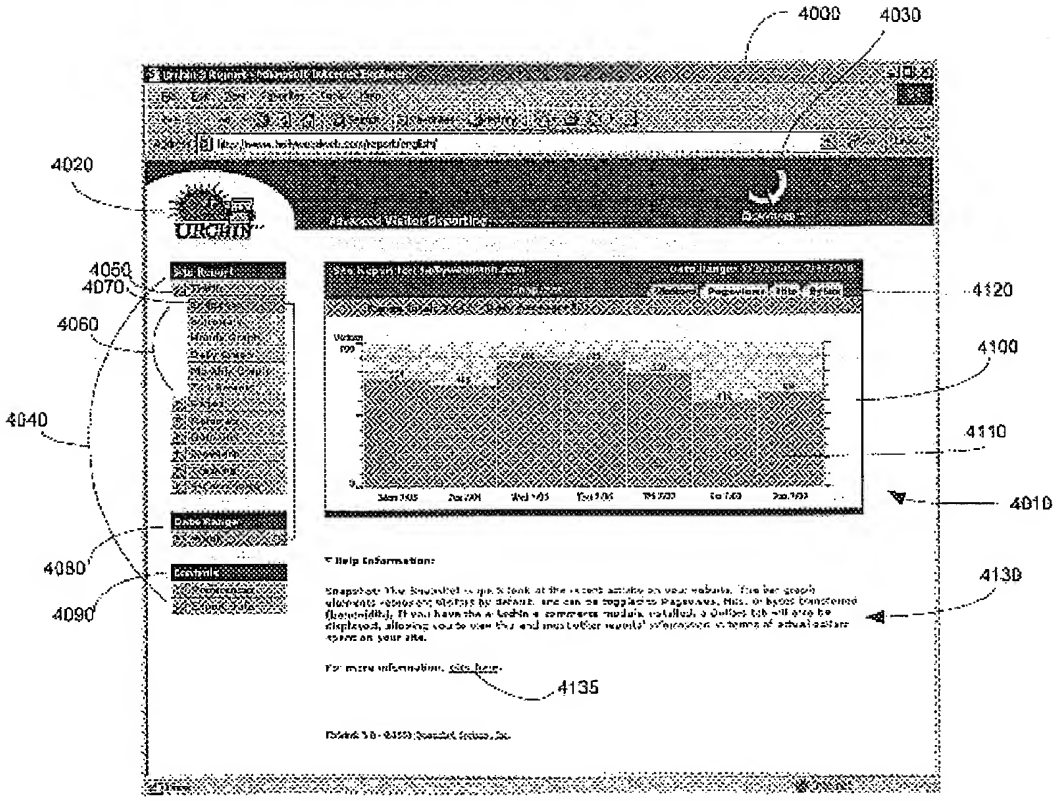

4000
4030
4020
4050
4070
4060
4040
4080
4090
4120
4100
4110
4010
4130
4135

Fig. 28

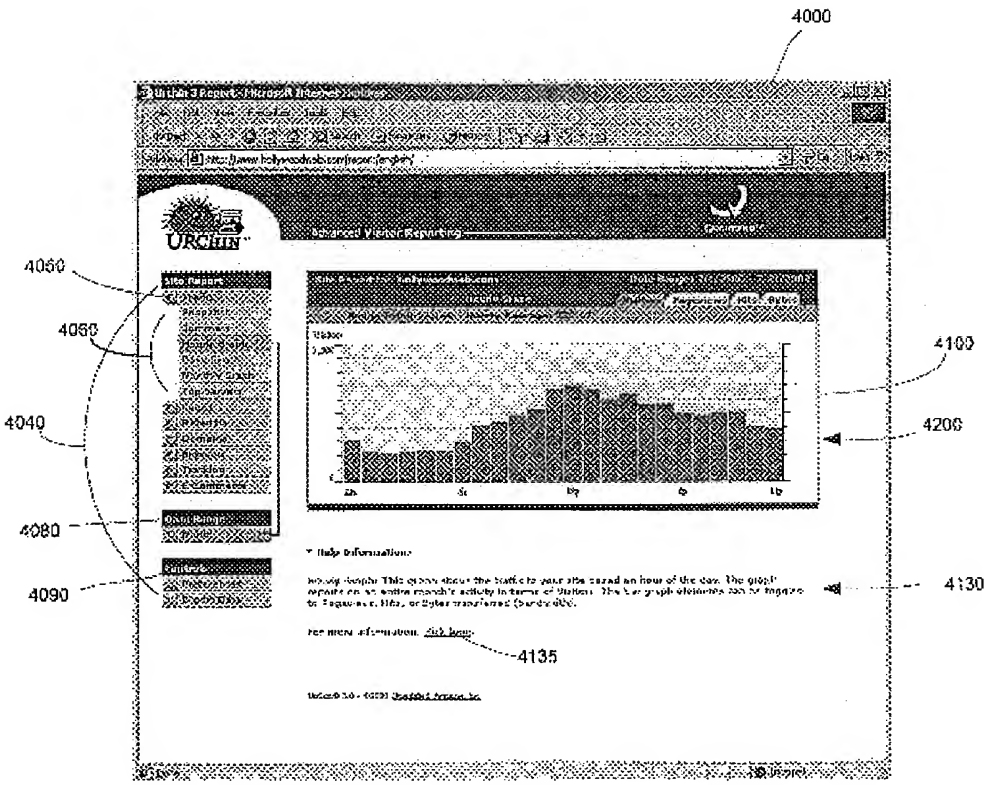


Fig. 29

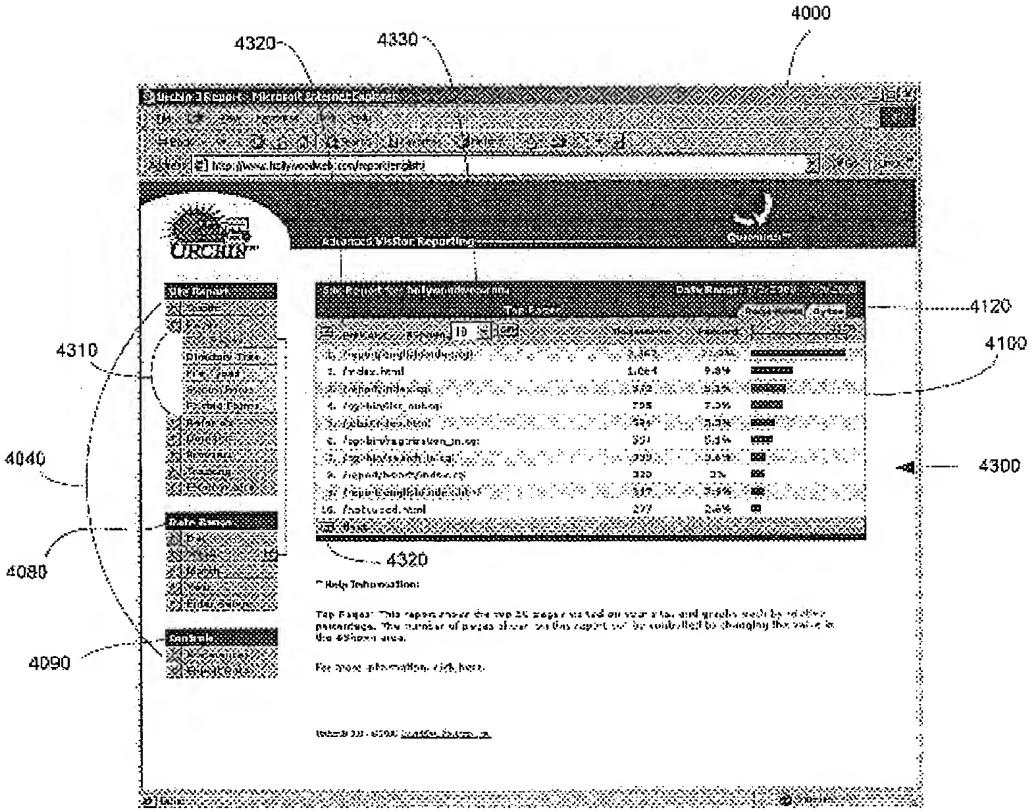


Fig. 30

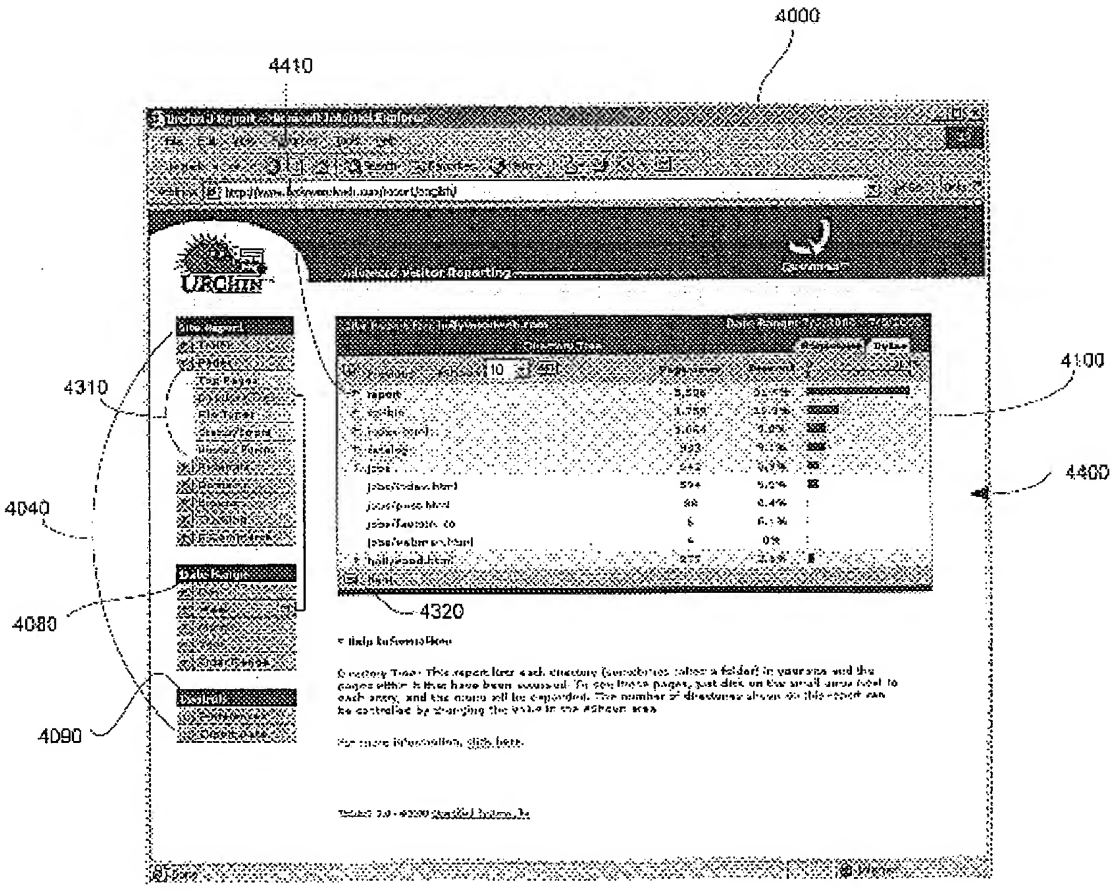


Fig. 31

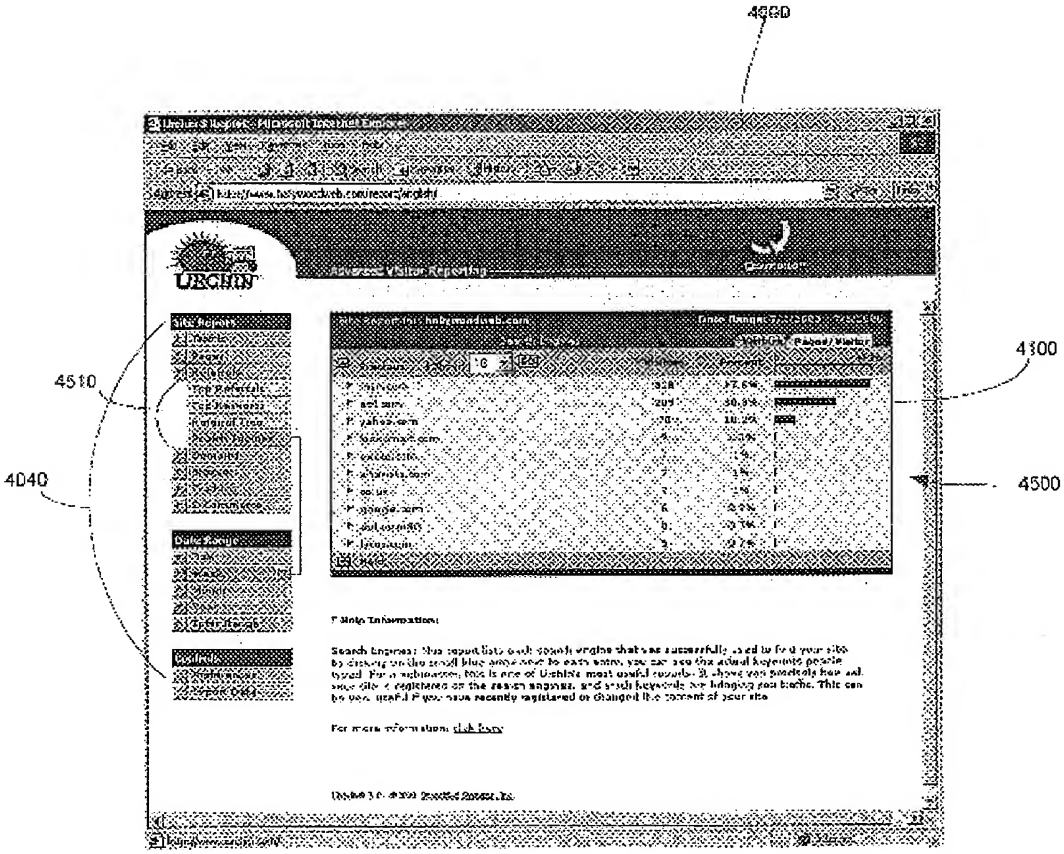


Fig. 32

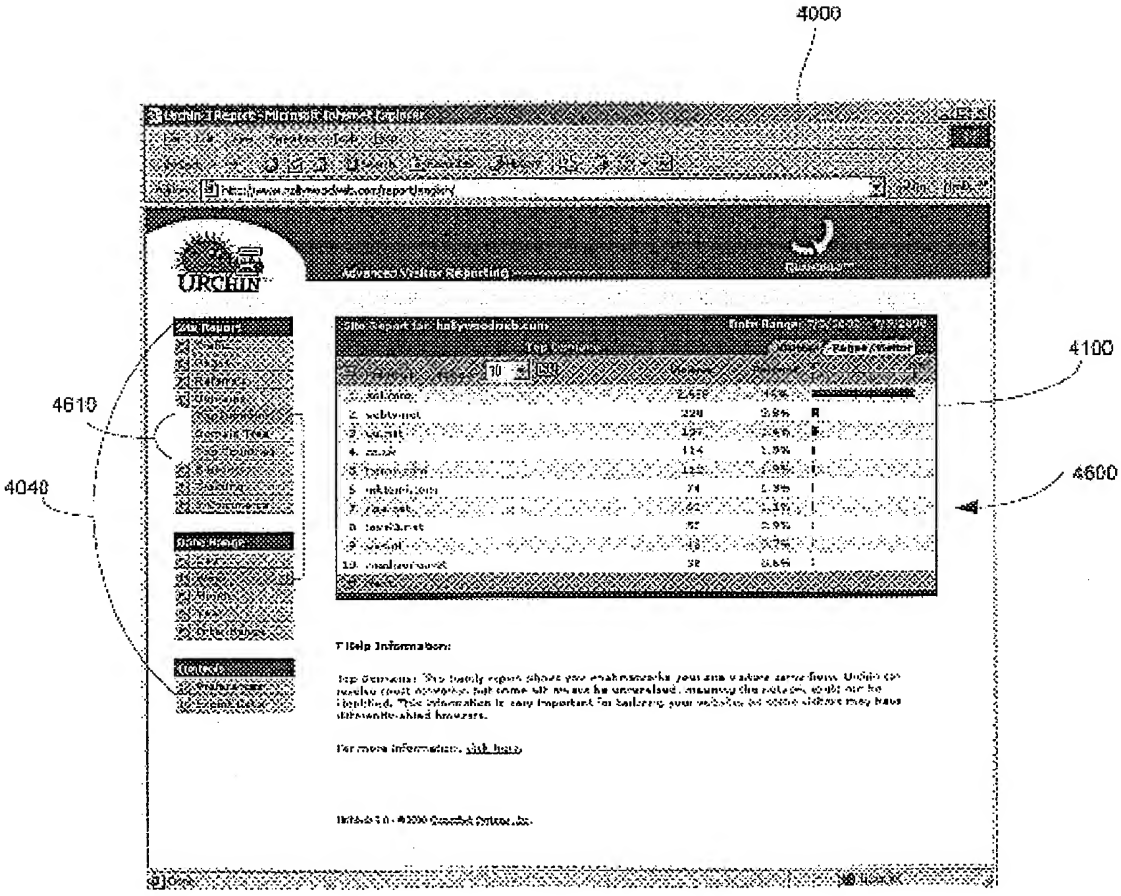


Fig. 33

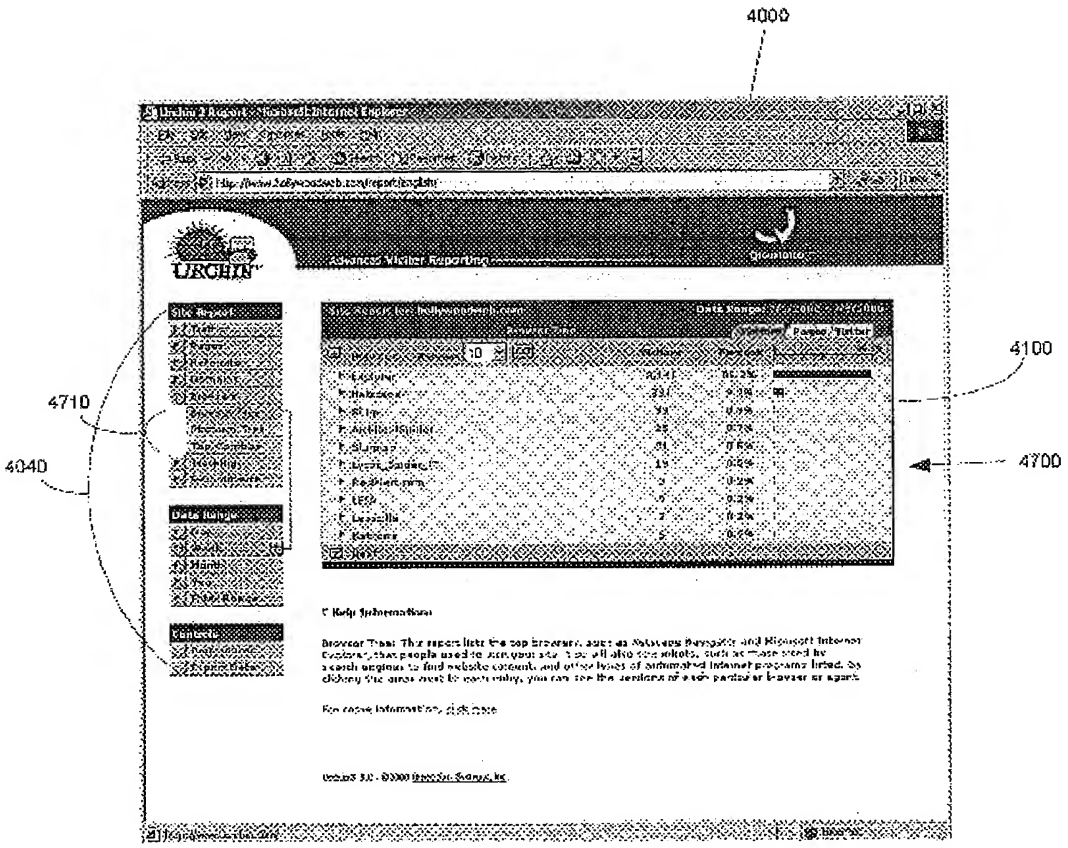


Fig. 34

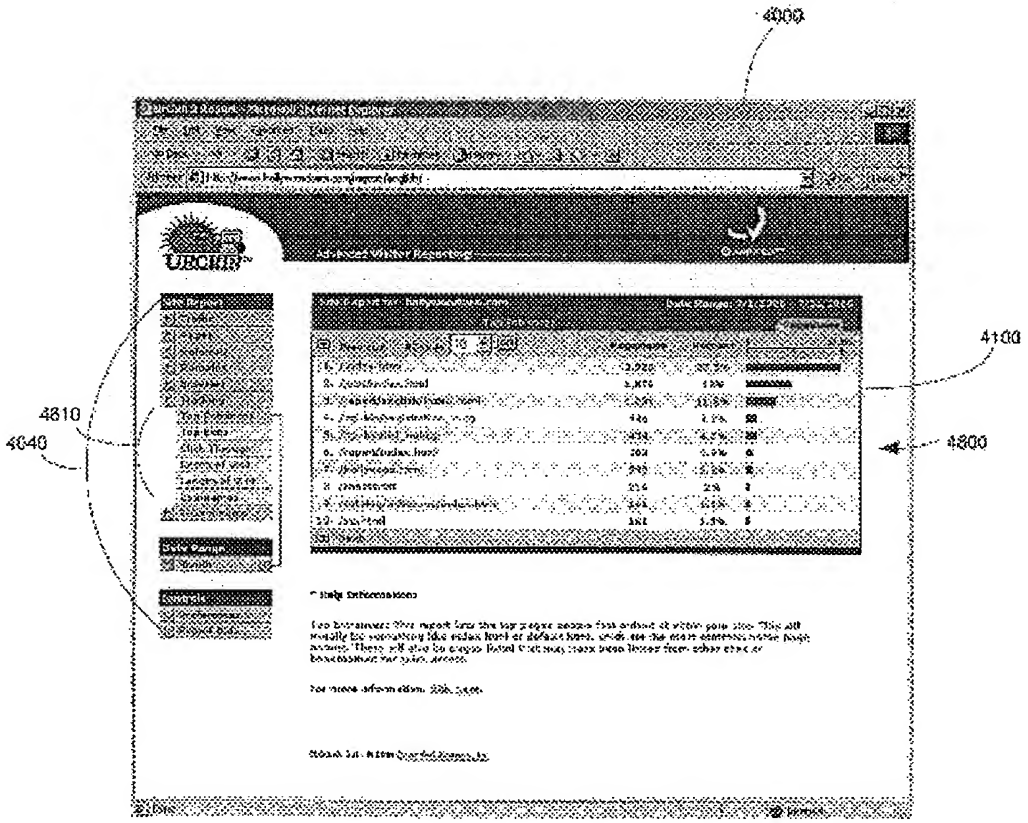


Fig. 35

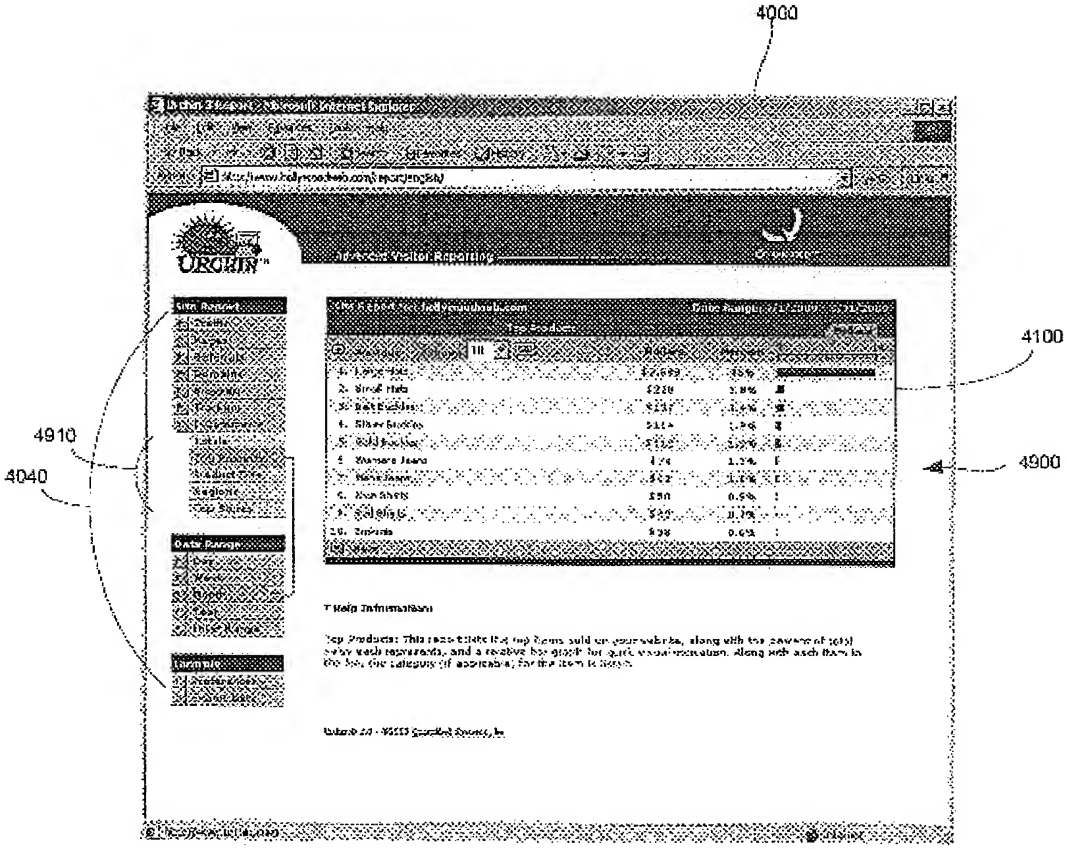


Fig. 36

SYSTEM AND METHOD FOR MONITORING AND ANALYZING INTERNET TRAFFIC

This application claims the benefit of Provisional application Ser. No. 60/157,649, filed Oct. 4, 1999.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to Internet traffic and, more specifically, to a system and method for monitoring and analyzing Internet traffic.

2. Description of Related Art

Internet web servers such as those used by Internet Service Providers (ISP), are typically configured to keep a log of server usage by the on-line community. For example, as a visitor to a website clicks on various hyperlinks and travels through a website, each step is recorded by the web server in a log. Each web page, image and multimedia file viewed by the visitor, as well as each form submitted, may be recorded in the log.

The type of information logged generally includes the Internet Protocol (IP) address or host name of the visitor, the time of the transaction, the request, the referring page, the web browser and type of platform used by the visitor, and how much data was transferred. When properly analyzed, this information can help marketing executives, webmasters, system administrators, business owners, or others make critical marketing, business, commerce and technical decisions. The data can be mined for all types of decision supporting information, e.g. analyzing which webbrowsers people are using, determining which banner ads are producing the most traffic, etc.

A problem with mining the raw log data for useful information is the shear volume of data that is logged each day. ISPs may have dozens of web servers containing thousands of websites that produce gigabytes of data each day. Providing a robust system that can be used on various platforms, that can efficiently process the huge amounts of data that are logged, and that can produce easy to use reports for each website in an automated fashion is a daunting task.

BRIEF SUMMARY OF THE INVENTION

In view of the above problems in the art, the present invention provides a system and method for monitoring and analyzing Internet traffic that is efficient, completely automated, and fast enough to handle the busiest websites on the Internet, processing data many times faster than existing systems.

The system and method of the present invention processes data by reading log files produced by web servers, or by interfacing with the web server in real time, processing the data as it occurs. The system and method of the present invention can be applied to one website or thousands of websites, whether they reside on one server or multiple servers. The multi-site and sub-reporting capabilities of the system and method of the present invention makes it applicable to servers containing thousands of websites and entire on-line communities.

The system and method of the present invention can create reports for individual websites, as well as reports for all of the websites residing on a single server or multiple server. The system can also create reports from a centralized system, in which reports are delivered upon request directly from the system database via a Common Gateway Interface (CGI).

The system and method of the present invention can also include real-time analysis and reporting functionality in which data from web servers is processed as it occurs. The system and method of the present invention can produce animated reports showing current activity on the web server, which can be used by administrators and managers to monitor website effectiveness and performance.

The system and method of the present invention can further include e-commerce analysis and reporting functionality in which data from standard traffic logs is received and merged with data from e-commerce systems. The system and method of the present invention can produce reports showing detailed "return on investment" information, including identifying which banner ads, referrals, domains, etc. are producing specific dollars.

The present invention can be achieved in whole or in part by a system for analyzing and monitoring internet traffic, comprising a relational database, a log engine that processes log files received from at least one internet server and stores data processed from the log files in the relational database; and a report engine that generates reports based on the processed data stored in the relational database. The system and method of the present invention preferably utilizes Visitor Centric Data Modeling, which keeps data associated with the visitor that generated it, and that allows for the cross-comparing of different elements of data coming from different log entries or different log files altogether.

The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrates embodiments of the invention and, together with the description, serve to explain the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic diagram of a system for monitoring and analyzing Internet traffic, in accordance with the present invention;

FIG. **2** is a schematic diagram of a series of hash tables stored by the database shown in FIG. **1**;

FIG. **3** is a block diagram of a preferred embodiment of the log engine shown in FIG. **1**;

FIG. **4** is a flowchart and schematic diagram illustrating a preferred control routine for the log parser module of FIG. **3**;

FIG. **5** is a flowchart and schematic diagram of a preferred control routine for the read line step of FIG. **4**, for accessing and processing log file data in real time;

FIG. **6** is a flowchart and schematic diagram illustrating a preferred control routine for the website identification module of FIG. **3**;

FIG. **7** is a flowchart and schematic diagram illustrating a preferred control routine for the visitor identification module of FIG. **3**;

FIG. **8** is a flowchart and schematic diagram illustrating a preferred control routine for the buffer update module of FIG. **3**;

FIG. **9** is a schematic representation of the contents of the database buffer shown in FIG. **3**;

FIG. **10** is a schematic diagram illustrating the operation of the DNS resolver module of FIG. **3**;

FIG. **11** is a flowchart and schematic diagram of a feedback loop control routine preferably used by the DNS resolver module of FIG. **3**;

FIG. **12** is a schematic diagram of how a preferred embodiment of an adaptable resolution mechanism in the DNS resolver module operates;

FIG. **13** is a flowchart of preferred control routines for various control loops within the DNS resolver module of FIG. **3**;

FIG. **14** is a flowchart and schematic diagram illustrating a preferred control routine for the database update module of FIG. **3**;

FIG. **15** is a schematic diagram illustrating the main components of the database shown in FIG. **1**;

FIG. **16** is a schematic diagram of a preferred embodiment of the report engine of FIG. **1**;

FIG. **17** is a flowchart of a preferred control routine for the session parser module of FIG. **16**;

FIG. **18** is a flowchart of a preferred control routine for the authentication module of FIG. **16**;

FIG. **19** is a flowchart of a preferred control routine for the data query module of FIG. **16**;

FIG. **20** is a flowchart of a preferred control routine for the format output module of FIG. **16**;

FIG. **21** is a schematic diagram of a preferred embodiment of a Javascript system used by the report engine of FIG. **16**;

FIG. **22** is an example of a visitor monitor report created by the system of the present invention;

FIG. **23** is an example of a temporal visitor drill down report created by the system of the present invention;

FIG. **24** is an example of a visitor footprint report created by the system of the present invention;

FIG. **25** illustrates an example of a system meter report created by the system of the present invention;

FIG. **26** shows visitor table containing e-commerce data, and residing in the database buffer;

FIG. **27** shows an example of an ROIR e-commerce report generated by the system of the present invention;

FIG. **28** shows an example of a snapshot report generated by the system of the present invention;

FIG. **29** shows an example of a user interface and an hourly graph report generated by the system of the present invention;

FIG. **30** shows an example of a top pages report generated by the system of the present invention;

FIG. **31** shows an example of a directory tree report generated by the system of the present invention;

FIG. **32** shows an example of a search engines report generated by the system of the present invention;

FIG. **33** shows an example of a top domains report generated by the system of the present invention;

FIG. **34** shows an example of a browser tree report generated by the system of the present invention;

FIG. **35** shows an example of a top entrances report generated by the system of the present invention; and

FIG. **36** shows an example of a top products report generated by the system of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

FIG. **1** illustrates a system **100** for monitoring and analyzing Internet traffic, in accordance with the present invention. The system **100** comprises a log engine **200**, a database **300** and a report engine **400**.

In operation, log files **510** generated by web servers **500** are sent to the log engine **200**. Web (Internet) traffic is served by the web server **500**. The web server **500** can host one or many individual websites. As visitors access the web servers **500** for content, each website hit or transaction is appended to a log. Each web server will typically have its own log file. Multiple websites on a single server could be logged centrally in one log file, or could be configured so that each website has its own log file. The system **100** is able to handle all of these different architectures.

The entries on each of the log files **510** are interleaved so that individual website hits or transactions are recorded in the order they are received. If a single log file contains log entries from multiple websites, the log entries are also interleaved so that individual hits or transactions from each website are recorded in the order they are received. Each line in the log files **510** represents a hit or a transaction from the website on one of the web servers **500**.

In addition to normal web traffic, many websites contain e-commerce enabled virtual "shopping carts" that allow visitors to securely buy products directly from the website. The system **100** can optionally analyze the demographics of on-line shopping by receiving e-commerce log files **580** produced by e-commerce enabled websites. The e-commerce log files **580** are transaction logs that contain information about each order placed on the website. Each of the e-commerce log files **580** generally contains data on the pricing of products purchased, dollar amounts and shipping regions. Sensitive information such as credit numbers, individual names and e-mail addresses are generally not stored on the e-commerce log files **580**. Dashed lines are used to represent the e-commerce log files **580** to indicate that the e-commerce functionality is an optional feature of the system **100**.

The preferred embodiment of the log engine **200** is responsible for processing all of the log files **510** and **580**, domain name system (DNS) resolving and updating the database **300**. The log engine **200** utilizes memory buffers, fixed-width data models and other techniques to efficiently process the log files **510** and **580**. In addition, the log engine **200** can be optionally configured to access live data. The operation of the log engine **200** will be described in more detail below.

The log engine **200** efficiently reads each line in each of the log files **510** and separates each line into its individual parts. The individual parts can include fields such as the IP address, time stamp, bites sent, status code, referral, etc. The log engine **200** utilizes a technique called Visitor Centric Data Modeling. Rather than parsing each log line and counting how many of one type of browser was used or how many times a particular webpage was viewed, Visitor Centric Data Modeling keeps that data associated with the visitor that generated it. One of the primary advantages of Visitor Centric Data Modeling is the ability to cross compare different elements of data coming from different log entries or different log files altogether. Visitor Centric Data Modeling allows one to determine what percentage of users that originated from a Yahoo™ search looked at a particular webpage.

A second benefit of Visitor Centric Data Modeling is reduction of overall data processing. Because many elements of the data will be the same during a visitor's visit, the information only needs to be processed once per visitor, rather than once per log line. For example, the primary domain name of the visitor will be the same for each log entry produced by a particular visitor. Visitor Centric Modeling allows one to process this information only once per visitor. Additional details on how the log engine **200** utilizes the Visitor Centric Data Modeling will be provided below.

The log engine **200** processes each log entry and updates the database **300**. The database **300** contains a series of hash

tables. The database **300** comprises a series of hash tables, as shown in FIG. **2**. The hash tables comprise a visitor table **310** and associated data tables **315**.

The visitor table **310** contains the central record for each visitor to a website. The hits, bytes, page views, and other fixed data parameters (hereinafter collectively referred to as "traffic information") are stored directly in the visitor table **310**. The remaining non-unique parameters, e.g., domain names, types of web browsers, referring web sites, etc., are stored relationally in respective data tables **315**. For example, one of the data tables **315** could be configured to store a list of the different domain names from which the visitors to the website being monitored by the system **100** originate, while another of the data tables **315** could be configured to store the names of the different types of web browsers used by the visitors to the web site being monitored by the system **100**.

The database **300** is relational and centers the data in the visitor table **310**, creating a Visitor Centric Data Model. The visitor table **310** contains a hash table **320** that is used for quickly seeking visitor records. Below the hash table **310**, the actual records **325** contain the traffic information of each visitor. Each unique visitor will have their own record in the visitor table **310**.

The visitor table **310** is relational in nature and has a relations area **330** that contains pointers **335** to records **350** within the data tables **315**. As discussed above, each of these data tables **315** store different visitor parameters such as domain, browser, and referral. Besides vastly reducing the storage requirements relative to a non-relational database, the data tables **315** can be used to create statistical reports on the usage of different visitor parameters.

Each data table **315** contains a hash table **340**, a rank table **345**, a record table **350**, and a string table **355**. The hash table **340** is used to seek records in the record table **350**. The rank table **345** is used to keep track of the top entries in the record table **350** based on the number of pointers **335** set to the records in the record table **350**. This is useful for quick access to reports. The record table **350** stores the actual records within the data table **315** including the traffic information associated with the parameter associated with the data table **315**. The record table **350** does not store the value of the parameter. Instead, the record table **350** contains a pointer to a record in the string table **355**. Each of these subtables (**320**, **325**, **340**, **345**, **350**, **355**) has fixed width records allowing for efficient reading, writing, and copying of the entire data sets.

The relational structure of the database **300** has at least two advantages. First, the visitor table **310** simplifies the task of processing each hit because, once the visitor is identified, the appropriate visitor table **310** can be identified and updated accordingly. Second, the data tables **315** simplify the task of report generation, because each of the data tables **315** stores a specific parameter (e.g., the names of the web browsers used by the visitors) and are ranked. Thus, each of the data tables **315** can easily deliver the top list of entries for a particular report.

Referring back to FIG. **1**, once the log files **510**, and optionally the e-commerce log files **580**, are processed by the log engine **200**, and the database **300** is updated, the system **100** is ready to deliver reports based on the updated information in the database **300**. A user **530** sends a report request **540** to the report engine **400** via a web server **520**. The report engine **400** obtains the data required to generate the report from the database **300**, generates the report, and delivers the generated report **550** to the user **530** via the web server **520**.

The web server **520** can optionally be one of the web servers **500** that created the log files **510** and **580**. The report engine **400** preferably utilizes javascript application techniques, dictionaries, and templates to provide flexible, efficient, customizable and attractive reports, as will be explained in more detail below. Reports are generated on the fly when requested by the user **530** using the standard Common Gateway Interface (CGI) of the web server **520**. Storage requirements are kept small as all HTML and graphics for the reports are generated as needed.

Log Engine (200)

FIG. **3** is a block diagram of a preferred embodiment of the log engine **200**.

The log engine preferably comprises a log parser module **210**, a website identification module **220**, a visitor identification module **230**, a buffer update module **240**, a DNS resolver module **250**, a database buffer **260** and a database update module **270**.

The log parser module **210** is responsible for the actual reading and processing of the log files **510** and the e-commerce log files **580**. The log parser module **210** can be configured to process either static log files or log files that are being generated live in real-time. The log parser module **210** loads each log line from the log files **510** and **580** and separates each log line into its individual fields.

The website identification module **220** is primarily used when multiple websites are being logged to the same file. A class of web hosting known as "virtual hosting" or "shared hosting" allows ISPs to offer solid performing website hosting service at reasonable prices. By setting up a robust set of servers with virtual hosting capable software, ISPs can place multiple websites on the servers, thus allowing the website owners to share the cost of the servers, maintenance, and networking.

However, as ISPs squeeze more and more websites onto a server in order to generate profit in an ever increasingly competitive industry, creating a system that is scalable becomes more and more difficult. One problem that administrators soon face is the number log files open during operation. Typically they will have at least one log file **510** for each website. As they add hundreds or thousands of websites to a server, the handling of all log files **510** becomes difficult. Moving, rotating and archiving all of the individual log files **510** becomes a burden. Also, system performance is compromised as resources are allocated to each open log file (many systems have a hard limit to the number of files that can be open simultaneously).

To solve this problem, the system and method of the present invention utilizes Subreport/Multisite Reporting Technology. This technology allows hosting providers to centralize the logging for all websites. Each server can have just one log file **510** for all websites, keeping resources in check. There is just one log file **510** to manage, rotate, process and archive, thus making the administrator's duties easier, less expensive and more scalable.

This website identification module **220** identifies each hit as belonging to a particular website. If the log file **510** or e-commerce log file **580** has data from only one website, then the task is simple and is handled through straight configuration. However, if the log file **510** or e-commerce log file **580** contains data from multiple websites, then the website identification module **220** employs a series of regular expression filters to perform the website identification. The website identification module **220** must be flexible and be able to pull any consistent part of the log file **510** for

website identification. The website identification performed by the website identification module is later used to determine what portion of the database **300** to write the data to.

As discussed above, the log engine **200** utilizes Visitor Centric Data Modeling. The first step in using a Visitor Centric Data Model is to be able to identify the specific visitor within each log file line. The visitor identification module **230** analyzes the fields in each hit (log file line) and identifies the hit as belonging to a new or existing visitor. Based on a unique identifier, such as an IP number or session id and a timestamp, the visitor identification module **230** determines which visitor record in the database **300** will need to be updated. If the timestamp of the hit is within a predetermined amount of time (e.g., 30 minutes) of an existing visitor, then the hit is considered as coming from that visitor.

The buffer update module **240** updates the parameters of the visitor record found by the visitor identification module **230** and stored on the database buffer **250** with the current hit's information. The timestamp of the hit is used to keep the chronological order of events intact.

The database buffer **250** is a volatile storage area, preferably RAM memory, that mirrors the actual database **300**. At the beginning of processing, current data is read from the database **300** into the database buffer **250**. After processing is complete, data is written back to the database **300**. The purpose of the database buffer **250** is to speed up the processing of each hit. Instead of accessing the actual database **300** for each hit in the log file **510** or e-commerce log file **580**, the database buffer **250** allows the log engine **200** to build up the data in the faster RAM memory location of the database buffer **250** and then flush data to the database **300** in larger chunks. The operation of the database buffer **250** will be explained in more detail below.

Before outputting the data to the database **300**, the data is passed through the DNS resolver module **260** for reverse DNS resolution of IP addresses. Most web servers log only the IP address of the visitor and not the host and domain information. The domain information provides valuable data about the physical and network location of visitors. The DNS resolver module **260** employs a customized resolution routine designed specifically to speed up the process of typically slow DNS operations.

The database update module **270** performs the task of updating the database with the contents of the database buffer **260**. The database update module **270** performs some processing (e.g., visitor sorting) before writing to the database **300**.

Preferred control routines for the log parser module **210**, website identification module **220**, visitor identification module **230**, buffer update module **240**, DNS resolver module **260** and database update module **270** will be described below.

Lop, Parser Module (**210**)

FIG. **4** is a flowchart and schematic diagram illustrating a preferred control routine for the log parser module **210** of FIG. **3**, configured to process static log files **510**. One of the most time consuming operations is reading and processing the raw log files **510**. With individual log files **510** containing potentially over a gigabyte of data, getting the raw data into the system **100** is an important step.

The purpose of the log parser module **210** is to efficiently read each log line **512** and separate it into its individual fields. The fields can include the IP address, timestamp, bytes sent, status code, referral, etc. As discussed above, each log line **512** in the log file **510** represents a hit or transaction from one of the web servers **500**.

The log parser module **210** employs a log buffer **600** and a pointer array **610** that is reused for each log line **512** in the log file **510**. Thus, memory allocation for this log parser module **210** is only done at startup. The states of the log buffer **600** and pointer array **610** at each step in the control routine shown in FIG. **4** are represented schematically under the corresponding step in the control routine.

The control routine starts at step **620**, where the pre-allocated log buffer **600** and the pointer array **610** are cleared. The log buffer **600** is cleared by setting the first character in the log buffer **600** to zero. The pointer array **610** is cleared by setting the values of all the individual pointers **612** to zero. It is important for stable processing to set all of the pointers in the pointer array **610** to zero before using the pointer array **610**.

The control routine then continues to step **630**, where the next log line **512** in the log file **510** is read into the log buffer **600**. For a log parser module **210** that is configured to process static log files **510**, step **630** is accomplished using standard file access library calls.

The control routine then proceeds to step **640**, field spacers are identified in the log buffer **600** and marked. The field spacers could be spaces, tabs, commas, or anything that can be used as the separator between the fields in the logging format.

At step **650**, the marked field spacers are replaced with a zero and the appropriate pointer **612** is set to the next character in the log buffer **600**. Although steps **640** and **650** are shown as separate steps for purposes of illustration, they are preferably performed at substantially the same time. Thus, with a single loop and without moving, copying or allocating any memory, the log buffer **600** containing the single log line **512** is converted into a series of smaller character strings, each representing a particular field **602**, and with each zero terminated.

The pointers **612** in the pointer array **610** can then be used to access the fields **602** as if they were separate strings. Accordingly, with minimal processing and absolutely no iterative memory allocation, each log line **512** is read and efficiently separated into its fields **602**.

Real-Time Control Routine for Log Parser Module (**210**)

FIG. **5** is a flowchart and schematic diagram of a preferred control routine for the read line step of FIG. **4**, for accessing and processing log file data in real time. A web server **500** under normal configuration is shown. The web server **500** handles all requests as they come in and logs each hit to the log file **510** by appending the log file **510** with data from each request.

The built in log file **510** acts as a buffer. It is the simplest and most robust way to pass data between the web server **500** and the live data access routine **700**. The live data access routine **700** can be turned on or off at will. Once started, the live data access routine **700** runs as a low priority daemon. The live data access routine **700** can exist in two states: wait **710** and process **720**, toggling between the two as data arrives into the buffer **510**.

As long as more data exists in the log file **510**, the system will stay in the process loop **720**. The control routine starts at step **730**, where the system checks for an "End of File" mark in the log file **510**. As long as this mark is not detected, control moves to read step **740**, where the next line in the log file **510** is read into the system. Control then continues to the finish control routine step **750**, which finishes the control routine steps in the log parser control routine of FIG. **4**, starting with the mark fields step **640** in FIG. **4**. All of the read, write and EOF routines are autonomous, which means the web server **500** can continue to write new data to the end of the log **510** during the live data access routine **700**.

Once the live data access routine **700** catches up and finishes the log file **510** by reaching the "End of File" marker, control moves to truncate step **760**, where the log file **510** is immediately truncated. The truncation call sets the size of the log file **510** to zero. Since appended files always check file sizes before writing, the next write from the web server **500** will automatically start at the beginning of the log file **510**. Control them moves to delay step **770**, which delays the control routine for a configurable amount of time (typically <=1 second). After this delay interval, control returns to the EOF step **730**, where the existence of new data is checked.

As long the log file **510** is empty, the live data access routine **700** will remain in the wait loop **710**. In this manner, the live data access routine **700** has real-time access to write data, while maintaining an arms length from the web server **500** itself.

Website Identification Module (220)

FIG. **6** is a flowchart and schematic diagram illustrating a preferred control routine for the website identification module **220** of FIG. **3**, which is designed to identify the website that created each log line **512** in a log file **510**. The log lines **512** are interleaved and written to the log file **510** as hits occur. The format of the log file **510** may vary from provider to provider. Some may use the canonical domain name in the log file **510**, while others will use a subdirectory in the URI to identify the website.

There are three configuration variables that pertain to the control routine shown in FIG. **6**. The subreport field (SF) specifies which field in the log file **510** contains the website identifier text. The subreport expression (SE) is a POSIX extended regular expression that is used to capture all or part of the field specified by SF. The report name expression (RN) is used to build the website name from the information captured by SE.

As discussed above, the log parser module **210** processes each log line **512** one at a time, and separates the log line **512** into separate fields **602**. In the log file **510** shown in FIG. **6**, log line field **602'** contains the website identifier text, and is also indicated in FIG. **6** with shading.

The control routine for the website identification module begins at step **800**, where log line field **602'** is selected using the SF configuration variable. The control routine then continues to step **810**, where the subreport expression (SE) is applied to the log line field **602'** selected at step **800**. This is done using POSIX extended regular expressions. The operator of the system **100** will need to be familiar with regular expressions or seek assistance from the manuals or technical support. The SE expression is used to match part or all of log line field **602'**. Parenthesis are used to define what is to be matched. For example, to simply capture the entire field, the SE expression "(.*)" would be used. Whereas, to capture the last parts of a "www" domain name, the expression "www\. (.*)" could be used. Whatever is matched inside the parenthesis is placed into a first variable $1. If there are multiple sets of parenthesis, then subsequent matched components are placed into additional variables (e.g., $2, etc.). In the example shown in FIG. **6**, two variables, $1 and $2, are used.

Next, at step **820**, the $1 and $2 variables are used to generate the name **830** of the website. Using the report name expression (RN), the variables $1 and $2 are replaced with the actual contents of the matched components. For example, if the following configuration parameters are set:

SF=2

SE=SITE:(.*)

RN=www.mydomain.com/$1

and the following space-separated log line was processed:

123.12.3.1 2000-08-02 SITE:human-resources/index.html 200 1234 the website identification module **220**, at step **800**, would select "SITE:human-resources" as log line field **602'** in the log line **512**. The SE would capture everything after the "SITE:" part of log line field **602'** as defined by the parenthesis location in the SE expression. This information is placed into the $1 variable. The website name **830** is then identified at step **820** by expanding the RN expression and replacing the $1 variable with the actual contents of the match. In this example, the resulting website name **830** is "www.mydomain.com/human-resources".

Visitor Identification Module (230)

FIG. **7** is a flowchart and schematic diagram illustrating a preferred control routine for the visitor identification module **230** of FIG. **3**. The log file **510** contains a number of log lines **512** or hits. Because the log lines **512** are interleaved, each log line **512** can be from a different visitor. As discussed above, the log parser module **210** processes each log line **512** in the log file **510**, and places the information in the log buffer. The log line fields **602** are separated and the data is passed to the visitor identification module **230**.

In the log file **510** shown in FIG. **7**, log line field **602"** contains the ID value and log line field **602'"** contains the timestamp of the hit. Log line fields **602"** and **602'"** are also indicated in FIG. **7** with shading.

The control routine for the visitor identification module **230** begins at step **900**, where log line fields **602"** and **602'"** are selected, as represented schematically under the Identify step **900** in FIG. **7**. The control routine then continues to step **910**, where the control routine looks up the ID value **602"** in the visitor hash table **320** of the visitor table **310** (shown in FIG. **2**). If the ID value **602"** does not exist in the visitor hash table **320**, control continues to step **920**, where a new visitor record is created in the visitor hash table **320**. If the ID value **602"** does exist in the visitor hash table, control skips to step **930**.

At step **930**, the timestamp **602'"** of the log line **512** is checked against the time range of the visitor record in the visitor hash table that corresponds to the ID value **602"**. If the timestamp **602'"** falls within a predetermined allowable range, control continues to step **940**, where the visitor record identified by the ID value **602"** in the visitor hash table is determined to be the existing visitor. Otherwise, control jumps back to step **910**, where the seek continues through records not previously searched until either a new record is created or another existing visitor is found.

The Visitor Centric Data Modeling described above has a very important and powerful benefit for real world applications. Many systems or websites will use multiple servers either mirroring each other or each handling a different part of a website. Extremely busy websites will often use an array of servers to handle the extreme load of traffic. Other websites may have a secure server area that resides on a special machine.

Whether for robustness or functionality, multiple server architecture is a common practice and appears to create a unique problem for internet traffic analysis and reporting. Each web server **500** will create its own log file **510**, recording entries from visitors as they travel through the website. Often, a single visitor will create log entries in the log file **510** for each web server **500**, especially if the web servers **500** perform different functions of the website.

It is desirable to be able to merge and correlate more than one log file **510** so as to have a complete and single record

of a particular visitor. The Visitor Centric Data Modeling described above makes this ability automatic. Since each hit is uniquely identified to a particular visitor and the timestamp of the hit is recorded, determining the order and location of the hits do not require any additional engineering. The system and method of the present invention will automatically correlate the multiple log files as if they were coming from a single log file.

Buffer Update Module (240)

FIG. **8** is a flowchart and schematic diagram illustrating a preferred control routine for the buffer update module **240** of FIG. **3**. The control routine starts at step **1000**, where it is determined if the log line **512** (hit) is from a new day by analyzing the timestamp **602'''** of the log line **512**. If the log line **512** is the first of a particular day, then control continues to step **1010**. Otherwise, control jumps directly to step **1020**.

At step **1010**, the database buffer **260** is preloaded with any existing contents for that day from the actual database **300**. Control then continues to step **1020**.

At step **1020**, the visitor record identified or created by the visitor identification module **230** is located in the database buffer **260**. The located visitor record **1040** is shown schematically under the locate visitor record step shown in FIG. **8**.

Control then continues to step **1030**, where the located visitor record **1040** is updated and new information for that visitor is inserted into the located visitor record **1040**. Traffic information is preferably updated for the visitor If the located visitor record **1040** is a new visitor record, then domain, referral, and browser information is preferably inserted into the located visitor record **1040**. All visitors preferably have their path information updated with any new pageview information. The updated visitor record **1050** is shown schematically below the update record step **1030**.

The timestamp **602'''** of the log line **512** is used to determine the order of the events that took place. An illustrative example is shown in FIG. **8**. In the example shown, a particular visitor is recorded as looking at Page A **1060** first and then Page C **1070**. If the next log line **512** processed from the log file **510** indicates that the visitor looked at Page B **1080**, the buffer update module **240** (at step **1030**) checks the timestamp **602'''** of the log line **512** to see where in the chain of events the page belongs. In the example shown, Page B **1080** occurred between Page A **1060** and Page C **1070**. Thus, Page B **1080** is inserted into the visitor record between the Page A **1060** and Page C **1070**. In this manner, the system **100** is able to update and correlate visitor data even if it is out of order in the log file **510**.

This automatic processing of multiple log files **510** came from the discovery that a single multi-threading web server, such as Netscape, may not log all hits sequentially in time. Due to the nature of multi-threading applications, it is possible that a single log file **510** may contain hits out of chronological order. The system and method of the present invention was therefore designed to handle this situation properly by checking the timestamp **602'''** of each log line **512** and inserting the information in the log line **512** into the appropriate place in the retrieved visitor record **1040** based on the chain of events. With this functionality, the processing of multiple load-balancing log files **510** is as simple as reading two log files instead of one.

The operation of the database buffer **260** will now be explained in more detail. As discussed above, the log engine **200** contains an internal database buffer **250** that mirrors part of the actual database **300**, preferably in RAM. This allows the log engine **200** to correlate and update visitor records quickly for each Is hit without accessing the actual database **300** for each hit. Data is correlated and cached into the database buffer **250**, which stores the data temporarily while processing the log file **510**. When processing of the log file **510** is completed, the database buffer **250** is written back to the database **300** in one step.

The use of a database buffer **250** results in more RAM usage, but has the advantage of lowering the overhead of database access, resulting in faster processing times. By pre-inspecting the log files **510**, the log engine **200** determines the time ranges being used and reads the appropriate data into the database buffer **250**. The database buffer **250** allows Urchin to avoid reading and writing to the database **300** for each log line **512**. Instead, the log engine **200** is able to make updates to the visitor tables **310** and the data tables **315** in memory (through the database buffer **250**) and then read and write the entire data block to and from the database **300**, which is preferably stored on disk, only once.

Database Buffer (250)

FIG. **9** is a schematic representation of the contents of the database buffer **250**. As discussed above, the database buffer **250** mirrors a portion of the database **300**, preferably in RAM. Thus the visitor tables **310'** and data tables **315'** in the database buffer **250** have the same format as the visitor tables **310** and data tables **315** in the actual database **300**.

Because the database buffer **250** is loaded with data from the database **300**, the visitor tables **310'** and data tables **340'** in the database buffer **250** are also relational. The data is centered in the visitor table **310'**, creating a Visitor Centric Data Model. The visitor table **310'** contains a partially filled hash table **320'** that is used for quickly seeking visitor records. Below the partially filled hash table **310'**, the actual records **325'** contain data about each visitor, such as hits, bytes, time, etc. Each unique visitor will have their own record in the visitor table **310'**. As each log line **512** is processed and identified to a particular visitor, that visitor's record is updated in the visitor table **310'** within the database buffer **250**.

Like the visitor table **310** in the actual database **300**, the visitor table **310'** in the database buffer **250** is relational in nature and has a relations area **330'** that contains pointers **335'** to the data tables **315'**. Like the data tables **315** in the actual database **300**, each of the data tables **315'** in the database buffer **250** store different visitor parameters such as domain, browser, and referral.

Each data table **315'** contains a hash table **340'**, a rank table **345'**, a record table **350'**, and a string table **355'**. The hash table **340'** is used to seek records in the record table **350'**. The rank table **345'** is used to keep track of the top entries in the record table **350'** based on the number of visitors using the parameter associated the data table **315'**. This is useful for quick access to reports. The record table **350'** stores the actual records within the data table **315'** including the traffic information associated with the parameter associated with the data table **315'**. The record table **350'** does not store the value of the parameter. Instead, the record table **350'** contains a pointer to a record in the string table **355'**. Each of these subtables (**320, 325, 330, 340, 345, 350, 355**) has fixed width records allowing for efficient reading, writing, and copying of the entire data sets. In addition to the fixed width nature of the subtables, the records in the subtables are allocated in large blocks. Memory allocation is not necessary for each new record individually.

Besides using efficient hashing algorithms for processing the data, resizing of the database buffer **250** is done so that data tables **315'** and the hash table **320'** in the visitor table **310'** are partially empty. This allows new records to be created instantly without allocating additional memory. The

gray areas in the data tables **315'** and the hash table **320'** in the visitor table **310'** indicate the used portions. As the tables reach a predetermined fullness threshold, they are preferably increased in size.

Once the processing of the log file **510** is complete, the data tables **315'** and the visitor table **310'** are written back into the actual stored database **300**. The subtables are written separately so that empty records are not stored on the disk that holds the actual database **300**. However, the fixed width nature of the subtables allows for efficient writing of entire blocks of data to the actual database **300**. The use of the database buffer **250** increases the speed of the log engine **200** by avoiding frequent memory allocation and disk access. By caching information in volatile memory (in the form of the database buffer **250**), and reading and writing fixed sized blocks of data, the log engine **200** is extremely fast.

DNS Resolver Module (**260**)

When a web server **500** receives a request for a web page, the web server **500** can either log the IP address of the visitor or it can use DNS to resolve the host and domain information of the visitor. While domain information is valuable for market analysis purposes, the resolution can add significant overhead to the web server **500** and delay the response of the web server to the end user. It is therefore desirable to pass the task of DNS resolving onto the system **100** of the present invention. This allows the web server **500** to stay as light and quick as possible for visitors accessing the website.

One of the biggest and most time consuming tasks in processing web server logs files **510** and creating valuable reports is the processing of the reverse DNS of the IP numbers. Each IP number must be converted to a host/domain name by using the distributed DNS system of the Internet. While the local name server may cache many of the answers, most will likely need to go out to the Internet for resolution.

The speed and scalability of the present system **100** is one of its advantages within the operations of large hosting companies. Whether processing single large websites or hundreds of thousands of small websites, the speed of the DNS resolver module **260** is important. The DNS resolver module **260** uses several innovative techniques for improving the speed and accuracy of the process, as will be described in more detail below.

For each IP number that needs resolving, a query is sent out to the Internet, where it bounces around a few times in the DNS system before coming back with the answer. This can take up to a couple of seconds, and sometimes the answer never comes back. As far as the local system is concerned, the bulk of this time is spent waiting for the response. An aspect of the present invention is the discovery that, since each of the queries is separate and unique, the processing can be done in parallel using multithreading techniques. The overall waiting can be done all at once instead of sequentially, thus shortening the overall processing considerably.

For example, if ten queries are each resolved in one second each, normal overall processing time would be ten seconds. However, by making the operation parallel so that all ten queries are processed simultaneously, then the overall processing time could be reduced to one second.

In practice, however, multithreading systems, such as those based on the use of POSIX threads and BIND 8.2, carry a significant overhead, and the setting up of sockets and memory locking reduces the benefits of the multithreading. Instead, the DNS resolver module **260** is not based on threads, but takes on the advantage of the parallel nature of the underlying protocols themselves to simulate threading operation without the additional overhead. Besides improving the overall speed and accuracy, the porting of the software is simplified, as it depends on less library calls.

The DNS resolver module **260** generally uses the User Datagram Protocol (UDP) on top of the IP network protocol. The UDP protocol has inherent parallel capabilities. Each query in the protocol is sent like a letter and uses a connectionless socket. Thus, multiple queries can be sent simultaneously without waiting for responses. Multiple responses can be received at any time and in any order. There is no guarantee that all the answers will return or that they will appear in any particular order. But, as long as the queries are tracked with an ID number, this UDP protocol can be used effectively to parallelize the DNS resolving operation without the overhead of threads.

FIG. **10** is a schematic diagram of illustrating the operation of the DNS resolver module **260**. The DNS resolver module **260** communicates with a local name server **1100**. The local name server **1100** is part of the Internet **1110** DNS system, but resides in the local network as a primary cacheing name server acting as a relay between the DNS resolver module **260** and the multiple DNS servers in the Internet **1110**.

The communication between the DNS resolver module **260** and the local name server uses several UDP sockets **1120**. The UDP sockets **1120** are setup and destroyed only once. Once the UDP sockets **1120** are established, the DNS resolver module **260** sends groups of queries **1130**. The queries **1130** are represented by "Q" boxes, and the responses (or answers) **1140** are represented by "A" boxes. The local name server **1100** relays the queries **1130** and answers **1140** to the Internet **1110** using a built-in DNS system. The local name server has cacheing ability and will remember recently asked queries **1130** and answer immediately instead of sending them on to the Internet **1110**.

One of the keys to shortening the processing time is to get as many queries **1130** out in the Internet **1110** at one time. This shortens the waiting significantly. Without the use of threads, the DNS resolver module **260** takes advantage of the UDP protocol, and goes through a loop of sending and reading queries **1130** and answers **1140**, as will be described in more detail below. Without waiting for all answers **1140** to return or for thread controls to be freed up, the DNS resolver module preferably sends as many queries **1130** as possible out into the Internet **1110**.

As incoming answers **1140** are decoded and the ID numbers are matched with the originating queries **1130**, the IP numbers are efficiently resolved in a manner that truly parallelizes the waiting and thus dramatically reduces the processing time without the overhead of threads.

During the flood of queries **1130** and answers **1140**, the DNS resolver module **260** goes through a primary loop of sending queries **1130** and reading answers **1140**. The kernel level sockets and the local name server **1100** can only handle so many requests simultaneously, and will drop excess queries **1130** if capacity is reached. While having a few (i.e., less than 10%) of the queries **1130** dropped is acceptable, having too many queries **1130** dropped will result in a large percentage of retries, creating additional work and actually slowing the overall processing time. However, it is desirable to send queries **1130** as rapidly as possible. What is needed is a feedback loop that can adjust the rate at which queries **1130** are sent and the waiting time for answers **1140**.

FIG. **11** is a flowchart and schematic diagram of a feedback loop control routine preferably used by the DNS resolver module **260**. A resolver loop **1150** controls a loop that cycles between sending and reading queries **1130** and answers **1140**.

The control routine starts at step **1160**, where a group of queries **1130** are sent through the UDP sockets **1120**. Once the queries **1130** are sent, control continues to step **1170**, where the resolver loop **1150** will try reading answers **1140** for a predetermined amount of time (Timeout). Once the Timeout is reached, the resolver loop will compare how many queries **1130** were sent against how many answers **1140** were received, and adjust the Timeout accordingly. Control then returns to step **1160**.

In addition to the socket speed capabilities, certain queries **1130** will inherently take longer than others. Some queries **1130** may need to go halfway around the world before resolving is completed. To minimize this effect, The resolver loop **1150** preferably begins with a very aggressive (short) Timeout, and progressively increases the Timeout to wait for the answers **1140** that are taking longer to arrive. The resolver loop **1150** will actually go through multiple loops and, at a slower pace, reattempt queries **1130** that were never answered. This adaptable resolving speed control gives the DNS resolver module **260** the ability to process the bulk of queries **1130** very quickly, and minimize the impact of a few slow or non-responding answers **1140**.

The DNS resolver module **260** is preferably configured with the ability to increase the resolving percentage and overall accuracy of the DNS resolving module **260** by adapting the query level. Under normal DNS resolving, the IP number is mapped to a specific hostname. For example, the IP number 202.110.52.16 may map to the hostname:

dial141-sddc2.npop43.aol.com

While it may be interesting to see the "dial141-sddc2.npop43" part of the hostname, one is typically only interested in the domain part (e.g., "aol.com"™) of the answer **1140**. The first part of the answer **1140** is specific to each provider and does not contribute to the demographic-type reporting that the present system **100** is preferably designed to provide.

In many networks, especially government, military, and small private networks, individuals IPs are not always mapped to anything. The query **1130** of a specific IP may return with an answer **1140** of "unknown host", which means that not all if the IPs were mapped back to the hostnames. Unfortunately this can reduce the resolving percentage by 20 or 30 percent, and skew the demographic data away from non-resolvable networks such as are often found in government, military, and educational networks.

To make up for this deficiency, the DNS resolving module **260** preferably deploys an adaptable resolving level mechanism that attempts to find out who controls the network in question if the hostname answer **1140** returns unsuccessfully.

FIG. **12** is a schematic diagram of how a preferred embodiment of the adaptable resolution mechanism operates. An unresolved IP number **1180** enters the DNS resolver module **260**. The DNS resolver module **260** will make multiple attempts at resolving the IP number by sending out multiple queries **1130** one at a time using different query information. The first query **1130***a* will attempt to resolve the entire specific IP number. If that returns unsuccessful, then a second query **1130***b* will attempt to resolve the Class-C network address (a Class-C network address is equivalent to the first three parts of an IP address).

If the second query returns unsuccessful, a third query **1130***c* will attempt to resolve the Class-B network address. If the third query is unsuccessful, a fourth query **1130***d* will attempt to resolve the Class-A network address. Many times, the Class-C or Class-B network addresses will resolve correctly when the IP address did not.

This technique improves the resolving accuracy dramatically and improves overall performance speed. In the case of government, military, educational and other private networks, "unresolved" percentages have been observed to go from 35% down to 8%, and "k12.us" and "navy.mil" show up in the top domains reports using the adaptable resolving level mechanism of the present invention. While these domains are not resolving their individual IPs, the general source of the traffic is obtained.

Using the above-described techniques, the DNS resolver module comprises a nested-loop, adaptable system that is fast and efficient. The nested-loop architecture is shown in FIG. **13**, which is a flowchart of a preferred control routine for the various loops within the DNS resolver module **260**.

The control routine begins by initializing some variables, including five configuration variables **1190** that include:

resolution target (RT);

number of loops (NL);

queries per write (NQ);

interquery delay (DQ); and

wait timeout (WT).

These five settings represent starting points for operation. They may be modified at runtime using the feedback mechanism discussed above in connection with FIG. **11**. The control routine comprises a main loop **1200**, a visitor loop **1210** nested within the main loop **1200**, and a read loop **1215** nested within the visitor loop **1210**. Dashed lines indicate asynchronous non-loop flow tasks. Sockets are initialized before the main loop **1200** begins.

The control routine begins at step **1220**, where it is determined if the loop should continue. The loop **1200** will continue as long as the "number of loops" (NL) has not been reached and the "resolution target" (RT) has not been reached. NL is incremented once the loop begins and RT is adjusted after each "decode answer" step **1290**, which will be described below.

The NL and RT variables serve an important purpose. They allow a high resolving target to be set, while setting an ultimate timeout. Depending on the size of the data, the number of sites, and the amount of time available, system administrators can modify these variables before operation. Once the resolution target, or the number of loops NL, is reached, the control routine will exit and clean up.

If NL and RT have not been reached, control continues to the visitor loop **1210**, whose purpose is to build and send queries for each unresolved visitor in the visitor table **310'**. The visitor loop **1210** starts at step **1230**, where the next unresolved visitor record from the visitor table **310'** is pulled and a query **1130** is built. An ID number **1250** from the visitor table **310'** is used in the building of the query **1130** so that it can be tracked later on as a response.

Next, at step **1240**, the query **1130** is sent to the UDP sockets **1120**. The UDP sockets **1120** are used in round robin fashion which allows minimizes the waiting for buffer controls.

A counter keeps track of how many queries **1130** have been sent in the current batch. Control then continues to step **1260**, where the counter is checked against the NQ variable. If NQ has not been reached, control loops back to step **1230**. An optional interquery delay (DQ) step **1270** can be inserted between steps **1260** and **1230** to keep the visitor loop **1210** from running too fast.

If NQ has been reached, which occurs when all the queries in the batch have been sent, NQ is reset and control then continues to the read loop **1215**. The read loop **1215** continues until the WT timeout variable is reached.

At step **1280**, any buffered incoming answers **1140** are read from the UDP sockets **1120**. Next, at step **1290**, each answer **1140** is decoded. Control then continues to step **1300**.

At step **1300**, it is determined if the answer **1140** is successful. If the answer **1140** is successful, control continues to step **1310**, where the visitor table **310'** is updated with the domain information. Control then continues to step **1330**.

If, at step **1300**, it is determined that the answer **1140** is unsuccessful, control continues to step **1320**, where the record in the visitor table **310'** is modified by changing the resolution status. The resolution status is used to control the resolution level, as discussed above. If the answer **1140** comes back as "unknown" then the resolution status is changed for that visitor record, indicating that the next query **1130** should attempt to resolve the larger network instead of the specific IP. Control then continues to step **1330**.

At step **1330**, the read loop **1215** condition is checked by determining if the incoming UDP sockets **1120** are empty and if the timeout WT has been reached. If the incoming UDP sockets **1120** are empty and the WT timeout has been reached, the read loop **1215** ends, and control flows back to the visitor loop **1210** at step **1340**. Otherwise, the read loop **1215** continues, and control loops back to step **1280**.

At step **1340**, it is determined if the resolution target (RT) has been reached. If it has, the visitor loop **1210** ends, and control flows back to the main loop **1200** at step **1350**. Otherwise, the visitor loop **1210** continues at step **1230** with the next batch of unresolved queries.

At step **1350** of the main loop **1200**, the WT timeout is adjusted (increased for the next loop). Control then continues to step **1220**, where NL and RT are checked, NL is incremented and starts the entire process over again if neither NL nor RT have been reached.

With minimal overhead, the DNS resolver module **260** takes advantage of the UDP protocol and maximizes the parallelization of the processing. Through a series of nested loops and control parameters, the DNS resolver loop is able to adapt both speed and level in order to meet the resolving target as quickly as possible. Multiple rounds and levels of queries **1130** are resent to cover lost or failed attempts, thereby increasing overall accuracy and resolution percentage dramatically. Thus, system administrators can put a cap on overall processing time, while maintaining a high resolution target.

Database Update Module (270)

Once the log file processing is complete and all the log lines **512** (hits) are represented in the visitor table **310'** on the database buffer **250**, the visitor table **310'** is sorted (if multiple websites are represented). The database buffer **250** is outputted to the database **300** using the database update module **270**.

FIG. **14** is a flowchart and schematic diagram illustrating a preferred control routine for the database update module **270**. The schematic diagram below the control routine steps illustrates what is occurring to the data during the control routine.

The control routine starts at step **1360**, where the visitors in the database buffer **250** are sorted based on their associated website identification. Preferably using a quicksort algorithm, the records in the database buffer **250** are sorted into groups that belong to the same website. If only one website is represented by the log file **510**, then step **1360** is trivial. However, in the case of multiple websites, the database buffer **250** is sorted into groups of visitors.

The control routine then continues to step **1370**, where the database **300** is opened. Then, at step **1380**, the database **300** is updated with the data in one of the visitor groups **1400**. The process then continues to step **1390**, where the database **300** is closed.

The control routine then loops back to step **1370**, and the database update process is repeated for each visitor group **1400**. By processing the records in groups, the overhead created by accessing the database **300** is reduced.

Database (300)

FIG. **15** is a schematic diagram illustrating the main components of the database **300**. As discussed above, the database **300** contains a visitor table **310** and data tables **315**. The structure is relational in nature as the visitor table **310** relates to information stored in the data tables **315**.

The database **300** also includes methods module **1410** that provides an interface for accessing, seeking, and inserting data into the visitor and data tables **310** and **315**. Both the log engine **200** and the report engine **400** access the methods module **1410**.

The methods module **1410** is the only module that is allowed to directly access the data in the database **300**. This creates a modularity to the database **300**, in which the format of the visitor table **310** and/or the data tables **315** can be modified without changing the interface to the other modules in the system **100**.

Report Engine

As ISPs add thousands of web sites to a single system, the creation of reports can begin to take as long as processing the data. With an ever increasing number of reports to create, the disk space and time needed to accomplish this side of the task can become a problem. The report engine **400** provides a centralized system that contains a single copy of the report templates and icons needed to generate reports, and delivers specific reports for a particular web site only when requested.

The report engine **400** only stores the data for each web site, and not the specific reports. Since the reports are web-based, they can be delivered on the fly as requested through the Common Gateway Interface (CGI) of the web server.

FIG. **16** is a schematic diagram of a preferred embodiment of the report engine **400**. The report engine **400** comprises a session parser module **1420**, an authentication module **1430**, a data query module **1440**, an format output module **1450** and a template/dictionary module **1460**.

In operation, a report request **540** received by the web server **520** from an end-user is sent by the web server **520** to the report engine **400** through the Common Gateway Interface (CGI) **1470** of the web server **520**. The CGI **1470** is a standard mechanism for web servers to allow an application to process input and deliver content dynamically via the web.

The session parser module **1420** reads the input from the report request **540** and sets internal variables accordingly. The variables are then used to determine the data to use, the report to create, and the format of delivery.

The authentication module **1430** verifies that the end-user that sent the report request has permission to view the requested report. Upon verification, the data query module **1440** queries the database **300** for the raw data needed to generate the requested report.

The raw data is passed to the format output module **1450**, which uses a set of templates from the template/dictionary module **1460** to format and create the report **550** to be sent

back to the end-user via the web server **520**. The use of templates and dictionaries in the template module allows for easy customization of the reporting format. Templates can be used to change branding and the overall look and feel of the report interface. Dictionaries in the template/dictionary module **1460** can be used to change the report language on the fly. The end-user can toggle which dictionary is used for reporting directly through the CGI interface **1470**.

The access and delivery of reports is preferably controlled using a Javascript application, which is preferably delivered to the end-user upon the first report request **540**. The Javascript Application provides the mechanisms for displaying report content and querying for new reports.

The operation of each of the modules in the report engine **400** will now be explained in more detail.

Session Parser Module (**1420**)

The session parser module **1420** is used to read and access data specific to the type of request being made. Furthermore, hosting operations are creating control panel interfaces with which customers can login and access all of their tools and applications from one web-based location. Customers login once into the control panel, and then have access to e-mail, website builder tools, newsgroups, etc.

In order to integrate the present system **100** into custom control panel interfaces, the session parser module **1420** is a flexible session sensitive system that allows the present system **100** to work seamlessly with the user's control panel.

FIG. **17** is a flowchart and schematic diagram of a preferred control routine for the session parser module of FIG. **16**. User requests for reports are generated and passed to the report engine **400** from the web server **520**. Since the system **100** only contains one report engine **400**, parameters **1500** are passed to the session parser module **1420** within the report engine **400** in order to determine which report to generate. The passing of parameters **1500** is built into the navigation of the reporting interface, i.e., as the end-user clicks through the navigation menus within the interface and selects a report, the proper parameters **1500** are automatically sent to the session parser module **1420**.

The parameters **1500** preferably contain three parts. The session-id **1510** is used to keep track of which user is logged into the system. The application data **1520** contains the report-specific parameters used to select the correct report. The user session info is an optional set of parameters that can be used to integrate the system **100** into a user control panel containing multiple applications.

The control routine **1420** begins at step with the read input step **1540**, which parses the list of parameters **1500** and separates the data into "name-value pairs." Control then passes to the identify variables step **1550**, which uses a pre-determined configuration **1560** to match the external name-value pairs with internal variables. This allows the system **100** to recognize custom variables being used by proprietary control panels and other user interface mechanisms.

Authentication Module (**1430**)

FIG. **18** is a flowchart of a preferred control routine for the authentication module **1430**. After the specific variables of the report request and session are determined, the authentication module **1430** provides a flexible way to check access authorization for report requesters. While the authentication module **1430** may user either built in functionality or access pre-existing user databases, the basic steps of the control routine are the same.

The control routine starts at step **1600**, where the identity of the user, the website and the report being requested are determined based on data from the session parser module **1420**. The control routine then continues to step **1610**, where the validation of the user is performed.

Based on configuration, step **1610** can either access internal configuration parameters, listing users and reports, or it can access an external source (not shown) for user validation. If the user is validated for the report request, then control continues to step **1630**, where the report request is passed to the data query module **1440**. If the validation fails, control jumps to step **1640**, where an error response is returned to the user.

Data Query Module (**1440**)

FIG. **19** is a flowchart of a preferred control routine for the data query module **1440**. This data query module **1440** accesses the methods module **1410** in the database **300** in order to receive a report-ready raw data set.

The control routine starts at step **1650**, where the identification of the requested report and other parameters parsed previously by the session parser module **1420** are formatted into a query that can be passed to the database **300**. The format of the query is based on the specification of the methods module **1410** in the database **300**. Typically, SQL type queries are created at step **1650**.

Next, at step **1660**, the query generated at step **1650** is sent to the database **300**. Then, at step **1670**, the data from the database **300** is received and stored in a buffer. The buffer now contains the raw unformatted data for the requested report. Control then continues to step **1680**, where the data received and stored in the buffer is passed to the format output module.

Format Output Module (**1450**)

FIG. **20** is a flowchart of a preferred control routine for the format output module **1450**. The control routine starts at step **1690**, where templates and dictionaries are obtained from the template/dictionary module **1460**. The templates and dictionaries are chosen based on the type of report and language desired.

Control then continues to step **1700**, where the requested report is formatted by merging the data stored in the buffer by the data query module **1440** with the chosen templates and dictionaries. Variables are replaced with values, and words are replaced with dictionary entries. The result is a web-based report ready for delivery custom created for each user. The report is delivered to the user at step **1710**.

Javascript System

The report engine **400** preferably uses a Javascript system comprising a special combination of HTML and Javascript to produce interactive reports that are extremely efficient and easy to use. The basic concept is that the Javascript, which is loaded into the user's web browser contains the code necessary to create the visual reports. Once loaded, the web server **520** only needs to deliver data to the web browser, which is then rendered on the user side of the Javascript system.

The benefits of Javascript system are less connections to the web server **520**. The user can experience real-time navigation, as many of the controls do not require new connections to the web server **520**. Opening menus and sorting data occur directly in the web browser. Used in conjunction with the CGI Reporting technology described previously, the Javascript system is extremely efficient and scalable for even the most crowded web server communities.

FIG. **21** is a schematic diagram of a preferred embodiment of the Javascript system. The system comprises an end-user web browser side **1810** and a server side **1820**.

When the end-user first accesses the report engine **400**, the report request is sent to the web server **520** which returns the frameset/application **1830** and icons **1840**. A Javascript

application **1850** resides hidden in the parent frameset **1860**. The Javascript application **1850** then draws the two frames: the navigation frame **1870** and the report frame **1880**. The navigation frame **1870** is drawn directly from the Javascript application **1850**.

As the end-user wants to see a different attribute of the report or data, they can click on navigational and control elements in either the navigation frame **1870** or the report frame **1880**. These control elements affect variables in the code of the frameset **1860**, which then redraws the necessary subframes. If the end-user has selected something that requires a new data set, only the data is requested and delivered from the web server **520** through the report engine **400**. The Javascript application **1850** loads the new data **1890**, and draws the subframes and reports accordingly.

Real-Time Reporting

The demand for real-time reporting comes from many sources. In today's fast-paced economy, marketing and advertising managers wish to make rapid decisions and have immediate access to data as it occurs. Likewise, webmasters and system administrators, who are charged with managing critical website systems and servers, need real-time monitoring tools in order to keep a finger on the pulse of their systems. The ability to monitor activity in real-time gives the system administrators the ability to react to problems and potential attacks. Likewise, managers can monitor marketing strategies and ad campaign effectiveness as they are released.

As described previously, the system **100**, using the live data access control routine shown in FIG. **5**, has the ability to record web traffic into the database **300** continuously as it occurs. Since, as describe above, the report engine **400** creates reports when they are requested, all reports can display up-to-date real-time information. In addition to general demographic and statistical reports, the system **100** is preferably configured to create a series of reports that are specifically designed to take advantage of real-time data.

Visitor Monitor

FIG. **22** illustrates an example of a visitor monitor report **1900** created by the system **100** of the present invention. The report **1900** preferably uses custom templates specifically designed for real-time reporting. The report **1900** is a web-based interface that provides a "live" real-time look at one of several possible data parameters **1910**, such as visitors, pages, hits, bytes and dollars. The report preferably includes a visitor monitor graph **1920** that is preferably refreshed approximately every second to reflect new data. The data in the visitor monitor graph **1920** preferably moves from right to left as time progresses. The current time **1930** is preferably indicated above the visitor monitor graph **1920**. In addition to the graphical display, the report **1900** preferably displays the current value **1940** of the data parameter **1910** currently being displayed, as well as the parameter's average value for that day **1950**.

By monitoring the visitor data parameter **1910**, the current traffic level can be monitored as it occurs. Controls **1960** are preferably provided that are configured so that the user can look at previous data, stop and freeze the graph, or continue with current data.

A small amount of Javascript is preferably used to control the refreshing of the visitor monitor report **1900**. In addition, the visitor monitor report **1900** preferably uses a small amount of Javascript to time and reload the image **1970**. The image **1970** is generated by the report engine **400**, and uses the PNG format for compact lightweight operation. Since only the image **1970** is reloaded approximately every second, the visitor monitor report **1900** does not flicker when viewed with most browsers, thus creating an animated appearance to the graph **1920**.

Temporal Visitor Drill Down

The images **1970** loaded into the visitor monitor report **1900** preferably include an HTML/javascript image map that provides "clickable" drill-down access to detailed information within the visitor monitor graph **1920**. The visitor monitor report **1900** preferably contains a series of invisible rectangles (not shown) which cover the surface of the visitor monitor graph **1920**. When the end-user clicks within the visitor monitor graph **1920**, within one of the rectangles, that rectangle is mapped to a specific point in time. This time information is then compiled into a URL query and sent to the server to provide information on that specific point in time.

FIG. **23** is an example of a temporal visitor drill down report **2000** created by the system **100** of the present invention, for displaying the time-specific data discussed above. All visitors **2010** that were currently active on the website at the selected time are listed by IP address and sorted based on the number of hits **2020**. Bytes **2030**, pageviews **2040**, and length of visit **2050** are also preferably shown for each visitor **2010**. The totals **2060** of bytes **2030**, pageviews **2040**, hits **2020** and length of visit **2050** for all visitors are also preferably displayed at the bottom of each column.

Administrators can use this drill down capability to quickly assess which visitors **2010** are responsible for the corresponding web server traffic. Hostile attacks from robots and web spiders can also be monitored in real-time. Administrators can take action against hostile clients by blocking their access to the servers.

Visitor Footprint

In addition to monitoring web server usage, the drill down capability described above is taken one step further. Each visitor **2010** listed in the Temporal Visitor Drill Down report **2000** is preferably selectable and linked to provide a visitor footprint on that specific visitor. All of the views are web-based and linking is preferably accomplished using simple HTML and Javascript. When the user selects a link on their browser, a new browser window opens and queries the report engine **400** for the specific information on that visitor.

FIG. **24** illustrates an example of a visitor footprint report **2100** created by the system **100** of the present invention. The visitor footprint report **2100** preferably contains detailed information on the activity of the selected visitor, including traffic information **2110**, browser information **2120**, referral information **2130**, domain information **2140** and the visitor path **2150** (the specific path the visitor took through the web site).

If the visitor shown in the visitor footprint report **2100** is responsible for an e-commerce transaction that is processed by the system **100**, then additional e-commerce information **2160** is preferably shown in the visitor footprint report **2100**. If the visitor shown in the visitor footprint report **2100** looked at multimedia clips that are captured by the system **100**, then additional streaming information **2170** is preferably shown in the visitor footprint report.

The browser information **2120** is preferably analyzed to see if it matches a known browser or platform. If the browser is recognized then an icon of the browser and platform **2180** can be optionally shown as part of the browser information **2120**. If the visitor is identified as a robot, then an icon of a robot (not shown) can be optionally shown as part of the browser information **2120**. This can be useful for quickly

identifying hostile attacks from aggressive robots and spiders which can flood the web servers **500** with requests, creating a slow down in response times.

The visitor footprint report **2100** can provide insight into the usage of the website as well as help analyze specific visitors. While the detailed activity of the visitor can be monitored, the system **100** preferably does not record, use, or display any personal or identification information such as e-mail addresses, names, etc. Each visitor, while specific in the database **300**, preferably remains anonymous.

System Meter

FIG. **25** illustrates an example of a system meter report **2200** created by the system **100** of the present invention. The system meter report **2200** is similar to the web-based visitor monitor report **1900** shown in FIG. **22**. However, instead of providing a full-sized analysis tool, the system meter report **2200** is designed to be small enough to fit on a desktop computer screen at all times.

The system meter report **2200** contains multiple thumbnail sized report images (**2210, 2220, 2230, 2240, 2250**) that all refresh in the same manner as the visitor monitor report **1900**. To access the system meter report **2200**, the end-user preferably selects a collapse button **1980** (shown in FIG. **22**) or a "system meter" navigation button (not shown) within the visitor monitor report **1900**. When the system meter report **2200** is requested from the visitor monitor report **1900**, the window containing the visitor monitor report **1900** preferably closes and a new smaller window appears on the desktop computer screen containing the system meter report **2200**.

The system meter report **2200** is preferably configured so that a user can resize the system meter report **2200** (with, for example, a computer mouse) creating a compact live web-meter that gives them constant monitoring of critical systems. The system meter report **2200** is also preferably configured so that selecting one of the report images (**2210, 2220, 2230, 2240, 2250**) re-opens the full-sized visitor monitor report **1900**.

The system meter report **2200** preferably displays graphs of visitors **2210**, hits **2220**, pages **2230**, bytes sent **2240**, and money **2250** (if e-commerce is activated).

E-Commerce Reporting

As businesses move from providing passive information about their products to providing interactive shopping capabilities, successful analysis of internet traffic can provide valuable information for making strategic business decisions.

In one preferred embodiment of the present invention, Return On Investment Reporting (ROIR) technology is used to provide the ability to report on internet traffic in terms of revenue. All aspects of the visitor reporting are correlated to dollars spent on the website, providing detailed analysis of when and where revenue is generated. Marketing and advertising managers can use this information to track the effectiveness of banner ads, the location of and behavior of shoppers and more.

The key to this technology is the present invention's ability to correlate data in a Visitor-Centric way. The Visitor-Centric configuration of the present invention allows the system **100** to report on dollars spent in correlation with any visitor parameter.

E-commerce websites use shopping cart software (hereinafter "shopping carts") to provide a secure method for on-line ordering. Shopping carts allow the end-user to add products to their virtual shopping basket, change quantities and check out, similar to a normal shopping experience. There are many commercial shopping cart products such as Miva's Merchant™ and Mercantec's Softcart™.

Whether an e-commerce site uses an off-the-shelf product or a custom engineered application, the concept is the same. The shopping cart software keeps track of each visitor shopping session. As products are added to an individual's shopping cart, the software updates the visitor's specific information. When the visitor decides to check out and purchase the products, the shopping cart provides the necessary shipping and billing forms and can process the transaction.

E-commerce Lop File Format

The internet traffic monitoring and analysis system and method of the present invention utilizes the e-commerce log files **580** produced by the shopping carts to perform the e-commerce data correlation. However, the log file formats used by different shopping carts can vary. A preferred e-commerce log file format for use with the internet traffic monitoring and analysis system and method of the present invention is described below.

The e-commerce log file format is preferably a tab-separated, multiline format. The transaction preferably begins with the exclamation mark (!) character (which is thusly prohibited from the rest of the data). The first line of the e-commerce log file preferably contains the geographic and overall information on the e-commerce transaction. Subsequent lines preferably contain details on individual products. The preferred basic format of the e-commerce log file **580** is as follows:

```
!transfield1            transfield2 . . .
productfield1           productfield2 . . .
productfield1           productfield2 . . .
.
.
.
transfield              transfield2 . . .
etc.
```

Blank fields preferably contain a dash (-) character. The preferred format for the transaction line is as follows:

```
\!%{ORDERID}%h%{STORE}%{SESSIONID}%t%{TOTAL}%
{TAX}%{SHIPPING}%{BILL_CITY}%
{BILL_STATE}%{BILL_ZIP}%
{BILL_CNTRY}
```

where	%{ORDERID}	is the order number.
	%h	is the remote host (see apache.org).
	%{STORE}	is the name/id of the storefront.
	%{SESSIONID}	is the unique session identifier of the customer.
	%t	is time in the common log format
	%{TOTAL}	is the transaction total including tax and shipping. (decimal only, no "$" signs).
	%{TAX}	is the amount of tax charged to the subtotal.
	%{SHIPPING}	is the amount of shipping charges.
	%{BILL_CITY}	is the billing city of the customer.
	%{BILL_STATE}	is the billing state of the customer.
	%{BILL_ZIP}	is the billing zip of the customer.
	%{BILL_CNTRY}	is the billing country of the customer

The preferred format for the product line is:

%{ORDERID}%{PRODUCTCODE}%{PRODUCTNAME}%{VARIATION}%{PRICE}%{QUANTITY}%{UPSOLD}		
where	%{ORDERID}	is the order number.
	%{PRODUCTCODE}	is the identifier of the product.
	%{PRODUCTNAME}	is the name of the product.
	%{VARIATION}	is an optional variation of the product for colors, sizes, etc.
	%{PRICE}	is the unit price of the product (decimal only, no "$" signs).
	%{QUANTITY}	is the quantity ordered of the product.
	%{UPSOLD}	is a boolean (1|0) if the product was on sale.

An aspect of the present invention is the optional provision of a plug-in module for existing shopping carts that will allow the shopping cart to create the e-commerce file log **580** in the preferred format.

E-commerce Visitor Correlation

In order to provide the ROIR reporting described above, the system **100** performs a special correlation between the e-commerce transaction data in the e-commerce log file **580** and normal website visitor traffic data in the standard log files **510**.

As discussed above, both the standard log files **510** and the e-commerce log files **580** are processed by the log engine **200**. As discussed above in connection with FIGS. **3–9**, each line of the log files **510** and **580** is processed and passes through the following steps. (1) the log line **512** of the log file **510** or **580** is read into the database buffer **250**; depending on the format of the log file, the log line **512** is processed and identified; (3) the website identification module is used if multiple websites are logged into the same log file **510** or **580**; (4) the visitor identification module uses the IP number and a timestamp found in the log line **512** (or session id) to establish the unique identity of the visitor; (5) the visitor ID is used to determine the record number in the visitor table **310'**; and (6) the record is updated with the information from the log line **512**.

FIG. **26** shows the visitor table **310'** in the database buffer **250**. As discussed above, the visitor table **310'** may include many fields, such as Hits **3000**, Bytes **3010**, Pages **3020**, Dollars **3030**, Referrals **3040**, Domain **3050**, Browser **3060**, etc. The visitor table **310'** is where the e-commerce correlation is done.

The e-commerce log file **580** will update the visitor's Dollars field **3030**, which indicates money spent by the visitor. The remaining fields are updated using the standard log file **510**. The Dollars field **3030** is used to determine money spent on the website in terms of the other fields (parameters).

For example, the Referral field **3040** in the visitor table **310'** holds a record number to an entry in the referral data table **3070**. The referral in the referral data table **3070** indicates how the visitor found the website. For example, if the visitor came from the yahoo.com™ website, then the referral field **3040** in the visitor table **310'** would hold the record number pertaining to the yahoo.com™ entry in the referral data table **3070**. All visitors that came from yahoo-.com™ would have the same referral record number in the referral field **3040**. Similarly, the Domain and browser fields **3050** and **3060** in the visitor table **310'** would hold record numbers to entries in the domain data table **3080** and browser data table **3090**. The other fields **3000**, **3010** and **3020** would likewise have data tables associated with them (not shown).

By looping over the visitor table **310'**, a money amount can be associated with each entry in any of the data tables. If, for example, a money amount is associated with each entry in the referral data table **3070**, all shoppers that came from yahoo.com™ (as an example) would be aggregated to produce a return-on-investment indicator.

FIG. **27** shows an example of an ROIR e-commerce report generated by the system **100** of the present invention. The report **3100** uses the domain data table **3080**, shown in FIG. **22**, to produce a top-10 report of Internet Domains whose visitors spent the most money on the website represented by the report **3100**. In the example report **3100**, Aol.com™ is the top domain in terms of money, spending approximately 46% of all money spent on the website.

The total money spent by all the visitors for each domain is displayed when the "Dollars" tab **3110** is selected. The average amount of money spent by each visitor at each domain can also be displayed selecting the "Dollars/Visitor" tab **3120**. The average amount of money spent by each visitor is calculated by dividing the total amount of money spent at each domain by the number of visitors to the domain.

E-commerce website owners can use these correlations to make valuable business decisions. The system and method of the present invention can correlate money to keywords, banner ads, search engines, referrals, domains, countries, browsers, platforms, or any other parameter of interest. The website operators can monitor the performance of search engine registrations, banner ad placements, regional ad campaigns, and more.

User Interfaces/System Reports

Examples of preferred user interfaces and system reports will know be discussed. All reports and interfaces are preferably web-based and viewed with a web browser. While not all possible reports are shown, the reports shown are representative of the types of reports and report configurations that are possible with the system and method of the present invention. Accordingly, it should be appreciated that the configuration and types of reports, as well as the configuration and types of user interfaces may vary from those shown while still falling within the scope of the present invention.

Further the user interfaces described below are for generation of static reports. The user interfaces used for real-time reports were described above in connection with FIGS. **22–25**.

FIG. **28** shows a preferred browser-based user interface **4000**. This is preferably the first user interface **4000** shown when the user first accesses the reporting interface of the system **100**. The user interface **4000**, preferably contains areas **4020** and **4030** for displaying product and/or company logos. The user interface **4000** also includes a main reporting window **4100** for displaying a currently chosen report.

The user interface **4000** preferably includes a navigation area **4040** that contains a collection of menus that group the available reports into different categories, preferably seven main categories, each with an associated link **4050**: Traffic; Pages; Referrals; Domains; Browsers; Tracking; and E-Commerce. A collection of links to specific reports **4060** related to a chosen category link **4050** is preferably displayed under a chosen category link **4050**. The currently chosen report link **4070** is preferably indicated by a change in color or shading. In the example shown in FIG. **28**, the currently chosen report link **4070** corresponds to the "Snapshot" report.

The user interface **4000** preferably includes a "date range" functions area **4080**. Depending on the report chosen, this date range functions area **4080** allows the user to select the date range of the report being shown. The user interface also preferably includes a controls area **4090** that preferably includes preferences and report exporting features. The preferences function of the controls area **4090** allows the user to change report settings, such as the language that is used for display. The exporting function of the controls area **4090** allows the user to export the currently viewed data for use in other applications, such as Microsoft Excel™.

The user interface **4000** also preferably includes a Help Information area **4130**, which gives a brief synopsis of the report being displayed and provides a link **4135** for more in-depth information.

Traffic Related Reports

The Snapshot report **4010** shown in FIG. **28** is preferably a bar graph **4110** of the last 7 days of web site traffic in terms of various fields, preferably Visitors, Pageviews, Hits, or Bytes. There are preferably tab controls **4120** on the report **4010** that allow the user to select which field is displayed. The date of each day is preferably shown below the bars in the graph **4110**.

FIG. **29** shows an example of an Hourly Graph report **4200**. The Hourly Graph report preferably shows traffic versus hour of the day in terms of various fields, preferably Visitors, Pageviews, Hits, or Bytes. There are preferably tab controls **4120** on the report **4200** that allow the user to select which field is displayed.

The Hourly Graph report **4200** is preferably a bar graph indicating the 24 hours of the day from left to right. This report allows administrators to see when peak activity is expected and when to plan site maintenance and upgrades.

Other reports available under the Traffic category preferably include the Summary, Daily Graph, Monthly Graph and Top Servers reports. The Summary report gives a text based summary of overall traffic to the site. The Daily Graph is similar to the Hourly Graph report **4200**, except that the traffic is displayed as a function of the day of the month. The Monthly Graph report provides traffic displayed versus month of the year, and the Top Servers report indicates which log files or servers are responsible for the most traffic in the cluster.

Pages Related Reports

FIG. **30** shows an example of a Top Pages report **4300**. The Top Pages report **4300** is one of the reports listed under the Pages menu **4310**. The Top Pages report **4300** preferably indicates a top-ten type list, ranking which pages in the website are the most visited. The tabs **4120** are preferably used to view the report **4300** in terms of either Pageviews or Bytes transferred. Next and previous buttons **4320** are preferably provided that allow the user to scroll through the Top Pages Report **4300**. The number of entries shown are preferably adjusted with the #Shown menu **4330**.

FIG. **31** shows an example of a Directory Tree Report **4400**. The Directory Tree Report **4400** is similar to the top pages report **4300** of FIG. **30**, except that the Directory Tree Report **4400** preferably includes links **4410** next to each entry that can be selected to open information below that entry. This allows for easy display and navigation of hierarchical type data, such as a directory structure.

The directory tree report **4400** indicates which directories within the website architecture are being accessed the most. Under each directory, the end user can drill down to see the subdirectories or individual pages contained within the primary directory by selecting the links **4410**.

Other pages-related reports in the Pages menu **4310** preferably include File Types, Status/Errors, and Posted Forms. The File Types report is a top-ten type report that indicates which file extensions or types are accessed the most. This allows the user to distinguish between HTML page, GIF images, etc. The Status/Errors report is a tree-type report that indicates status codes and error messages that occur during web content delivery. The Posted Forms report is a top-ten type report that indicates the forms that were submitted using the POST method as defined in the HTTP protocol.

Referrals Related Reports

FIG. **32** shows an example of a Search Engine report **4500** from the Referrals menu **4510** of the navigation area **4040**. The Referrals menu **4510** provides reports related to how the visitor found a website.

The Search Engines report **4500** contains a tree-type list of the most used search engines. Each search engine can then be expanded to see which keywords were used during those searches.

Additional reports in the Referrals menu **4510** preferably include Top Referrals, Top Keywords, and the Referral Tree. The Top Referrals reports is a simple top-ten type list of the top referring URLs. The Keywords report indicates the top keywords used across all search engines. The Referral Tree report breaks down the Referral URLs by domain.

Domains Related Report

FIG. **33** is an example of a Top Domains report **4600**, which indicates regional and network information about the visitors. The visitor's domain is determined by the IP address of the visitor. The domain is resolved using the Reverse DNS module **260** within the log engine **200** described previously.

Additional reports under the Domains menu **4610** in the navigation area **4040** preferably include Domain Tree and Top Countries. The Domain Tree report provides the different levels of domains. Primary domains such as .com and .edu are shown first. Preferably, these can be expanded to show detailed information within. The Top Countries report expands and analyzes which countries people are coming from.

Browsers Related Reports

FIG. **34** shows an example of a Browser Tree report **4700**, which is a tree-type report that ranks the most widely used browsers by visitor to the website. Browsers such as Internet Explorer™ and Netscape™ are reported upon as a whole and by version. Each primary browser can be expanded to see the breakdown by version.

Additional reports in the Browsers menu **4710** of the navigation area **4040** preferably include Platform Tree and Top Combos. The Platform Tree report indicates the operating system of the visitor. It is a tree-type report that can be expanded to show the versions under each platform. The Top Combos report ranks the correlation between browser and platform.

Tracking Related Reports

FIG. **35** shows an example of a Top Entrances report **4800**. As part of the Tracking menu **4810** within the navigation area **4040**, the Top Entrances report **4800** indicates the starting point of visitors in the website. Additional reports in the Tracking section **4810** preferably include Top Exits, Click Through, Depth of Visit, Length of Visit, and Usernames.

The Top Exits report provides a list of the last page visitors looked at before leaving the site. The Click Through report indicates the click percentage from any one page to another. The Depth of visit report provides a histogram of the number of pages viewed by visitors. The Length of Visit report provides a histogram of the time spent on the site by

visitors. The Usernames report analyzes the usage of password protected areas of a website by listing the usernames that were used to login to the those sections.

E-Commerce Related Reports

FIG. **36** shows an example of a Top Products report **4900**, which is part of the E-Commerce menu **4910** in the navigation area **4040**. The Top Products report **4900** indicates the Top Products purchased from the site by revenue. Additional reports in the E-Commerce menu **4910** preferably include Totals, Product Tree, Regions, and Top Stores. The Totals report gives a summary of overall e-commerce activity. The Product Tree report groups products by category. The Regions report indicates the regional location of shoppers including cities, states and countries. If multiple store fronts are used by the same shopping system, the Top Stores report can breakdown revenue by storefront.

System Integration

The system and method of the present invention can be configured in many different ways. From single server configurations to complex load balancing systems, the system and method of the present invention is flexible in its integration abilities. While it is difficult to catalog every possible architecture, several possible configurations are described below.

Webserver vs. Dedicated Server

The system and method of the present invention can be implemented directly on the web server **500** that produces the log files **(510, 580)**, or on a separate dedicated computer. If the system **100** is implemented directly on the web server **500**, it can then use the web server **500** for the reporting web server **520**. If the system **100** is implemented on a dedicated box, then a web server **520** will need to be configured on the dedicated computer in order to service the report requests.

Access to log files is slightly more complicated on a dedicated computer. If the system **100** is implemented on a dedicated computer, then the log files **(510, 580)** from the web server **500** will need to be accessible to the dedicated computer by using FTP, NFS, or some other suitable disk access method. Real-time processing of log files requires writing permission to the log files **(510, 580)** which may require an extra configuration step if using a dedicated computer.

As long as the log files **(510, 580)** are accessible (with permissions) and a web server is available, the system **100** can work just as well directly on the web server **500** or on a dedicated computer.

One Website vs. Multiple Websites

The system and method of the present invention can handle multiple websites. During integration, a unique reporting directory for data storage can be configured for each of the websites. The system **100** will link the individual report directories back to the main installation, so that there is only one copy of the templates and icons. Users will need internet access to the reporting directories. Thus, the web server **520** configuration should be similar to the system **100** configuration. A typical installation will use a subdirectory within each website's document root to store and access the reports.

Whether there is one website or many, the integration preferably provides a unique web accessible directory for each website configuration.

Distributed Logs vs. Central Logs

Web servers **500** can be configured to create unique log files **(510, 580)** for each website in the web server's configuration, or a single log file **(510, 580)** for all websites in the configuration. The system of the present invention can be configured to work with either of these architectures. If each website has its own unique log file, then the log files are preferably entered into the system's **100** configuration, so that each website has its own area in the configuration. The system **100** will process the logs one at a time treating each website independently.

If the web server **500** is configured to log centrally, then the log file **(510, 580)** preferably contains some website identification marker in order for the system **100** to be able to sort and process the log file **510**. As described previously, the website identification module **220** is designed to capture some parameter within the log file, in order to determine which hits go with which websites. This type of integration can automatically detect new websites as they are added to the web server **500** without modifying the configuration of the system **100**.

Single Log vs. Multi-Log

The system and method of the present invention can be configured for systems that reside on one web server **500** or on multiple web servers **500**. Multiple web servers **500** are often used for load-balancing, redundancy, and functional serving. Multiple web servers **500** will each have their own set of logs **510**. The system and method of the present invention can automatically correlate the visitor centric data from multiple logs **(510, 580)**, as described previously. By simply entering the multiple logs in the configuration, the system **100** will process the multiple logs.

E-Commerce vs. No-Commerce

As described previously, the system and method of the present invention can include e-commerce reporting functionality, and can be used in conjunction with shopping cart software. The e-commerce log files **580** are handled similarly to the multi-log architecture discussed above. The e-commerce logs **580** are simply treated as multiple logs. Additional entries will need to be made in the configuration.

For integration into e-commerce systems, the shopping cart software is preferably configured to create the preferred log file format described above.

Control Panel vs. Stand-Alone

Many larger hosting providers are creating centralized web-based control panels that contain links to all of the tools and systems available to the hosting clients. Hosting clients log into the control panel once and are provided with customized information and interaction, such as accessing their unique e-mail account, uploading files to their unique website, and viewing the reports created by the system of the present invention.

Stand-alone systems will have unique reporting directories for each website. Thus, accessing the reporting area is simple, as each reporting area will have a unique URL. Protecting report access can be accomplished through the web server **520** itself, and does not require integration with the system **100**.

For control panel integrations, the system and method of the present invention is preferably sensitive to session controlling technology. As described previously, the session parser module **1420** has the ability to detect custom variables and control report delivery from a central location.

The various components of the present invention are preferably implemented on internet (e.g., web) servers, which may be or include, for instance, a work station running the Microsoft Windows™ NT™, Windows™ 2000, UNIX, LINUX, XENIX, IBM, AIX, Hewlett-Packard UX™, Novel™, Sun Micro Systems Solaris™, OS/2™, BeOS™, Mach, Apache Open Step™, or other operating system or platform. However, the various components of the present invention could also be implemented on a pro-

grammed general purpose computer, a special purpose computer, a programmed microprocessor or microcontroller and peripheral integrated circuit elements, an ASIC or other integrated circuit, a hardwired electronic or logic circuit such as a discrete element circuit, a programmable logic device such as a FPGA, PLD, PLA, or PAL, or the like. In general, any device on which a finite state machine capable of implementing the modules and control routines discussed above can be used to implement the present invention.

While the foregoing description includes many details and specificities, it is to be understood that these have been included for purposes of explanation only, and are not to be interpreted as limitations of the present invention. Many modifications to the embodiments described above can be made without departing from the spirit and scope of the invention, as is intended to be encompassed by the following claims and their legal equivalents.

What is claimed is:

1. A system for analyzing and monitoring internet traffic, comprising:

a relational database; and

a log engine that processes log files received from at least one internet server and stores data processed from the log files in the relational database;

wherein the log engine, when new log file data is present in the log file, processes said new log file data and determines an "end of file" location on the log file, and, when new log file data is not present in the log file, periodically checks the log file at predetermined time intervals to check for new log file data, and commences processing of any new log file data at a most recent determined "end of file" location on the log file.

2. The system of claim **1**, wherein the relational database comprises a plurality of hash tables.

3. The system of claim **1**, wherein the plurality of tables comprise:

a visitor table that stores traffic information generated by a visitor to an internet site hosted by the at least one internet server; and

a plurality of data tables, wherein each data table stores records related to a respective parameter.

4. The system of claim **3**, wherein the visitor table comprises at least one pointer to at least one record stored in at least one of the data tables.

5. The system of claim **3**, wherein the respective parameters comprise:

domain names from which the visitor originated; and

web browsers used by the visitor; and

other internet sites that referred the visitor to the internet site.

6. A system for analyzing and monitoring internet traffic generated by visitors to at least one internet site hosted by at least one internet server, comprising:

a visitor centric database; and

a log engine that receives log files from the at least one internet server, processes hits logged in each log file, and stores traffic data derived from the hits in the visitor centric database, wherein the visitor centric database associates the traffic data derived from the hits with a visitor that generated the hit;

wherein the log engine, when new log file data is present in the log file, processes said new log file data and determines an "end of file" location on the log file, and, when new log file data is not present in the log file, periodically checks the log file at predetermined time intervals to check for new log file data, and commences processing of any new log file data at a most recent determined "end of file" location.

7. The system of claim **6**, wherein the visitor centric database comprises a plurality of hash tables.

8. The system of claim **6**, wherein the plurality of hash tables comprise:

a visitor table that stores traffic information derived from the hits, wherein the visitor table contains a unique visitor record for each visitor; and

a plurality of data tables, wherein each data table stores data related to a respective non-unique parameter.

9. The system of claim **8**, wherein the visitor table comprises at least one pointer to at least one record stored in at least one of the data tables.

10. The system of claim **8**, wherein the respective non-unique parameters comprise:

domain names from which the visitors originated;

web browsers used by the visitors; and

other internet sites that referred the visitors to the at least one internet site.

11. The system of claim **8**, wherein the log engine comprises a visitor identifier that determines if a hit originates from a new visitor or an existing visitor.

12. The system of claim **11**, wherein the visitor identifier is adapted to create a new visitor record if a hit originates from a new visitor.

13. The system of claim **6**, wherein the log engine comprises a database buffer that temporarily stores the traffic data derived from the hits logged in the log files.

14. The system of claim **11**, wherein the log engine further comprises a database updater that transfers the traffic data temporarily stored in the database buffer to the visitor centric database.

15. The system of claim **12**, wherein the database updater sorts the traffic data temporarily stored in the database buffer before transferring the traffic data to the visitor centric database.

16. The system of claim **6**, wherein the log engine comprises a log parser that reads log lines in the log files, and separates each log file into individual fields.

17. The system of claim **6**, further comprising a report engine that generates reports using the traffic data stored in the visitor centric database.

18. The system of claim **17**, wherein the report engine is adapted to generate reports that correlate money spent by a visitor to any other parameter of the traffic data.

19. The system of claim **17**, wherein the report engine is adapted to generate a top products report that ranks products purchased by visitors based on revenues generated by the products.

20. The system of claim **17**, wherein the report engine is adapted to generate at least one of a totals report, product tree report, regions report, and top scores report.

21. The system of claim **17**, wherein the report engine is adapted to generate a report that displays a value of at least one traffic data parameter over at least one predetermined time period.

22. The system of claim **21**, wherein the report comprises a snapshot report in which the at least one predetermined time period comprises seven consecutive 24 hour time periods.

23. The system of claim **21**, wherein the report comprises an hourly graph report in which the at least one predetermined time period comprises a plurality of consecutive one hour time periods.

24. The system of claim 17, wherein the report engine is adapted to generate a top pages report that ranks website pages based on number of visitors to the website pages.

25. The system of claim 24, wherein each entry in the top pages report comprises a link for accessing additional information about a respective website page.

26. The system of claim 17, wherein the report engine is adapted to generate a search engine report that displays a list of most used search engines.

27. The system of claim 17, wherein the report engine is adapted to generate a top domains report that displays regional and network information about the visitors.

28. The system of claim 17, wherein the report engine is adapted to generate a browser tree report that ranks internet browsers based on which internet browsers are used most by visitors to a website.

29. The system of claim 28, wherein each internet browser entry in the browser tree report includes a link for accessing information about different versions of a respective internet browser.

30. The system of claim 17, wherein the report engine is adapted to generate a top entrances report that ranks starting points of visitors to a website based most used starting points.

31. The system of claim 17, wherein the report engine is adapted to generate at least one of a summary report, a daily graph report, a monthly graph report, a top servers report, a file types report, a status/errors report, a posted forms report, a top referrals report, a top keywords report, a referral tree report, a domain tree report, a top countries report, a platform tree report, a top combos report, a top exits report, a click through report, a depth of visit report, a length of visit report, and a usernames report.

32. The system of claim 17, wherein the report engine comprises:

a template module that stores report templates;

a session parser that receives report requests from the at least one server, and determines a type of report requested, data needed to generate a requested report and a format for the requested report;

an authenticator that receives an identity of a report requester from the session parser, and verifies that the report requester has permission to view a requested report;

a data query module that receives authentication information from the authenticator, and that queries the database for data needed to generate the requested report if the report requester has permission to view the requested report; and

a format output module that receives the data needed to generate the requested report from the database, retrieves templates for the requested report from the template module, creates the requested report, and delivers the requested report to the report requester.

33. The system of claim 32, wherein the template module also stores at least one dictionary.

34. The system of claim 33, wherein the format output module is adapted to create the requested report in a selectable language using the at least one dictionary.

35. The system of claim 6, wherein the log engine is configured to process hits from multiple internet sites that are logged to a single log file.

36. The system of claim 6, wherein the log engine comprises a website identifier that identifies a source of each hit.

37. The system of claim 6, wherein the log engine comprises a domain name system (DNS) resolver that determines host and domain information for each visitor.

38. The system of claim 37, wherein the DNS resolver utilizes reverse DNS resolution to determine the host and domain information for each visitor.

39. The system of claim 6, wherein the log engine is adapted to process e-commerce log files that contain information on money spent by a visitor.

40. An article of manufacture, comprising:

a computer usable medium having computer readable program code embodied therein for analyzing and monitoring internet traffic generated by visitors to at least one internet site hosted by at least one internet server, the computer readable program code in the article of manufacture comprising:

computer readable program code for receiving log files from the at least one internet server;

computer readable program code for processing hits logged in each log file by:

initiating a process loop when new data is present in the log file, during which the new data is processed and an "end of file" location is determined for use as a starting point for subsequent new data processing, and

initiating a wait loop when new data is not present in the log file, wherein the wait loop delays data processing for a predetermined time interval before checking for new data in the log file;

computer readable program code for storing traffic data derived from the hits in a database; and

computer readable program code for associating the traffic data derived from the hits and stored in the database with a visitor that generated the hit.

41. The article of manufacture of claim 40, wherein the database comprises a plurality of hash tables.

42. The article of manufacture of claim 41, wherein the plurality of hash tables comprise:

a visitor table that stores traffic information derived from the hits, wherein the visitor table contains a unique visitor record for each visitor; and

a plurality of data tables, wherein each data table stores data related to a respective non-unique parameter.

43. The article of manufacture of claim 42, wherein the visitor table comprises at least one pointer to at least one record stored in at least one of the data tables.

44. The article of manufacture of claim 42, wherein the computer readable program code for processing hits logged in each log file comprises computer readable program code for determining if a hit originates from a visitor with a preexisting visitor record in the database.

45. The article of manufacture of claim 44, wherein the computer readable program code for determining if a hit originates from a visitor with a preexisting visitor record in the database creates a new visitor record if a hit originates from a visitor without a preexisting visitor record in the database.

46. The article of manufacture of claim 40, further comprising computer readable program code for temporarily storing the traffic data derived from the hits logged in the log files.

47. The article of manufacture of claim 46, wherein the computer readable program code for storing traffic data derived from the hits in a database comprises computer readable program code for transferring the temporarily stored traffic data to the database.

48. The article of manufacture of claim 47, wherein the computer readable program code for transferring the temporarily stored traffic data to the database sorts the temporarily stored traffic data before transferring the traffic data to the database.

49. The article of manufacture of claim 40, wherein the computer readable program code for processing hits logged in each log file further comprises computer readable program code for reading log lines in the log files, and for separating each log line into individual fields.

50. The article of manufacture of claim 49, further comprising computer readable program code for generating reports using the associated traffic data stored in the database.

51. The article of manufacture of claim 40, wherein the computer readable program code for processing hits logged in each log file processes hits originating from multiple internet sites and logged to a single log file.

52. The article of manufacture of claim 40, wherein the computer readable program code for processing hits logged in each log file comprises computer readable program code for identifying a source of each hit.

53. The article of manufacture of claim 40, wherein the computer readable program code for processing hits logged in each log file comprises computer readable program code for determining host and domain information for each visitor.

54. The article of manufacture of claim 53, wherein the DNS resolver means computer readable program code for determining host and domain information for each visitor utilizes reverse DNS resolution to determine the host and domain information for each visitor.

55. A system for analyzing and monitoring internet traffic generated by visitors to at least one internet site hosted by at least one internet server, comprising:

a database;

a log engine that receives log files from the at least one internet server, processes hits logged in each log file, and stores traffic data extracted from the processed hits in the database, wherein the log engine comprises,

a database buffer that temporarily stores traffic data received from the database,

a log parser that processes each hit in each log file, and separates each hit into its individual fields, wherein the log parser, when new log file data is present in the log file, processes said new log file data and determines an "end of file" location on the log file, and, when new log file data is not present in the log file, periodically checks the log file at predetermined time periods to check for new log file data, and commences processing of any new log file data at a most recent determined "end of file" location.

a visitor identifier that receives each hit's individual fields from the log parser, identifies each hit as originating from either a new visitor or an existing visitor, and creates a new visitor record in the database buffer if a hit originates from a new visitor,

a buffer updater that, prior to processing a new log file, copies previously stored data from the database to the database buffer, and wherein, for each hit, the buffer updater locates in the database buffer the visitor record identified or created by the visitor identifier for a respective hit, and updates the identified or created visitor record in the database buffer with traffic data derived from the respective hit, and

a database updater that copies updated traffic data from the database buffer to the database after all hits in the new log file have been processed; and

a report engine that generates reports using the traffic data stored in the database.

56. The system of claim 55, wherein the log engine further comprises a website identifier that identifies a source of each hit.

57. The system of claim 56, wherein the website identifier identifies the source of each hit from website identifier text received from the log parser for each hit.

58. The system of claim 55, wherein the log engine further comprises a domain name system (DNS) resolver that determines host and domain information for each visitor to an internet site.

59. The system of claim 58, wherein the DNS resolver is adapted to process multiple DNS queries in parallel.

60. The system of claim 55, wherein the log engine is adapted to process e-commerce log files that contain information on money spent by the visitor.

61. A method of analyzing and monitoring internet traffic generated by visitors to at least one internet site hosted by at least one internet server, comprising the steps of:

receiving log files from the at least one internet server;

processing hits logged in each log file, as each hit is logged to each log file, by:

(a) processing new hits present in a log file,

(b) determining an "end of file" location on the log file,

(c) waiting for a predetermined time period if no new hits are present in the log file,

(d) checking for new hits in the log file after the predetermined time period, and

(e) processing any new hits discovered in the log file by starting at the determined end of file location in the log file;

storing, in a database, traffic data derived from the hits; and

associating the traffic data derived from the hits and stored in the database with a visitor that generated the hit.

62. The method of claim 61, further comprising the step of generating reports using the associated traffic data stored in the database.

63. The method of claim 62, wherein the traffic data derived from the hits is stored in a plurality of hash tables.

64. The method of claim 63, wherein traffic information derived from the hits are stored in a visitor hash table that contains a unique visitor record for each visitor, and wherein data related to at least one non-unique parameter is stored in respective data tables.

65. The method of claim 64, wherein the visitor hash table comprises at least one pointer that points to at least one record stored in at least one of the data tables.

66. The method of claim 64, further comprising the steps of:

determining if a hit originates from a visitor with a preexisting visitor record in the database; and

creating a new visitor record if the hit originates from a visitor without a preexisting visitor record in the database.

67. The method of claim 61, further comprising the step of temporarily storing the traffic data derived from the hits in a buffer prior to storing the traffic data in the database.

68. The method of claim 67, further comprising the step of sorting the traffic data stored in the buffer prior to storing the traffic data in the database.

69. The method of claim 61, wherein the step of processing hits logged in each log file comprises the steps of:

reading log lines in the log files; and

separating each log line into individual fields.

70. The method of claim 69, wherein the hits logged in each log file are processed in real time as each hit is logged to a log file.

71. The method of claim 61, further comprising the step of identifying a source from which each hit originates.

72. The method of claim 61, further comprising the step of determining host and domain information for each visitor.

73. The method of claim 72, wherein host and domain information for each visitor is determined using reverse domain name system (DNS) resolution.

74. A method of processing a log file to obtain traffic data, comprising the steps of:

copying previously stored traffic data from a database to a database buffer;

separating hits logged in the log file into individual fields, wherein each hit is processed as it is logged to the log file by:

(a) processing new hits present in the log file,

(b) determining an "end of file" location in the log file,

(c) waiting for a predetermined time period if no new hits are present in the log file,

(d) checking for new hits in the log file after the predetermined time period,

(e) processing any new hits discovered in the log file by starting at the end of file location in the log file, and

(f) repeating steps (a)–(e);

identifying each hit as originating from either a new visitor or an existing visitor;

creating a new visitor record in the database buffer if a hit originates from a new visitor;

for each hit, locating the visitor record identified or created and updating the identified or created visitor record in the database buffer with traffic data derived from the respective hit; and

copying updated traffic data from the database buffer to the database after all hits in the log file have been processed.

75. The method of claim 74, further comprising the step of generating a report based on the traffic data in the database.

76. The method of claim 74, wherein hits originating from multiple sources are logged to the log file.

77. The method of claim 76, further comprising the step of identifying a source from which each hit originates.

78. The method of claim 74, further comprising the step of determining host and domain information for each visitor.

79. The method of claim 78, wherein host and domain information for each visitor is determined using reverse domain name system (DNS) resolution.

* * * * *

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(54) **WEB SITE WITH AUTOMATIC RATING SYSTEM**

(76) Inventor: **Paul J. Kurzrok**, 64-33 99 St., 4A, Forest Hills, NY (US) 11374

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(58) **Field of Search** 709/217, 219, 709/223, 224, 204, 205, 206, 313, 328, 329

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,872,850 * 2/1999 Klein et al. 380/49
5,913,040 * 6/1999 Rakavy et al. 370/229
6,064,980 * 5/2000 Jacobi et al. 705/26
6,081,788 * 6/2000 Appleman et al. 705/14

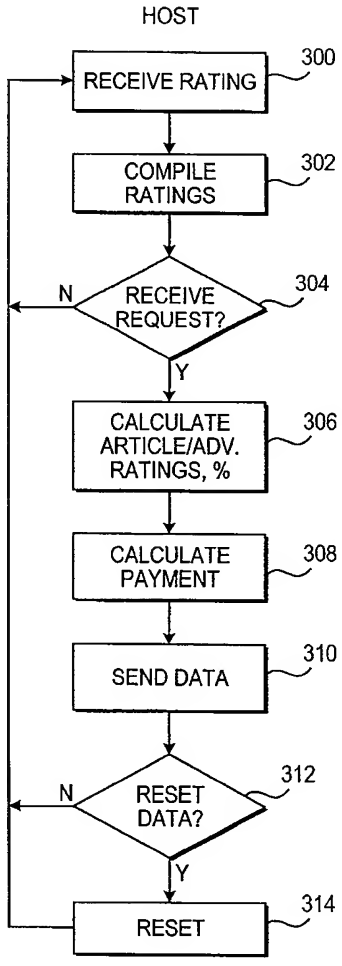
* cited by examiner

Primary Examiner—Viet D. Vu
(74) *Attorney, Agent, or Firm*—Steinberg & Raskin, P.C.

(57) **ABSTRACT**

In an Internet or similar distributed computer network-based information distribution system, a site host includes a totaling element for totaling ratings for articles and advertisements associated with a particular web page. The ratings are generated by each reader after the reader has read the article or advertisement. The ratings are totaled and used to generate a cumulative rating parameter representative of the popularity of the article. Additionally a predetermined relationship is used to derive from said rating parameters to generate a payment amount to be paid to the author of the article.

14 Claims, 7 Drawing Sheets



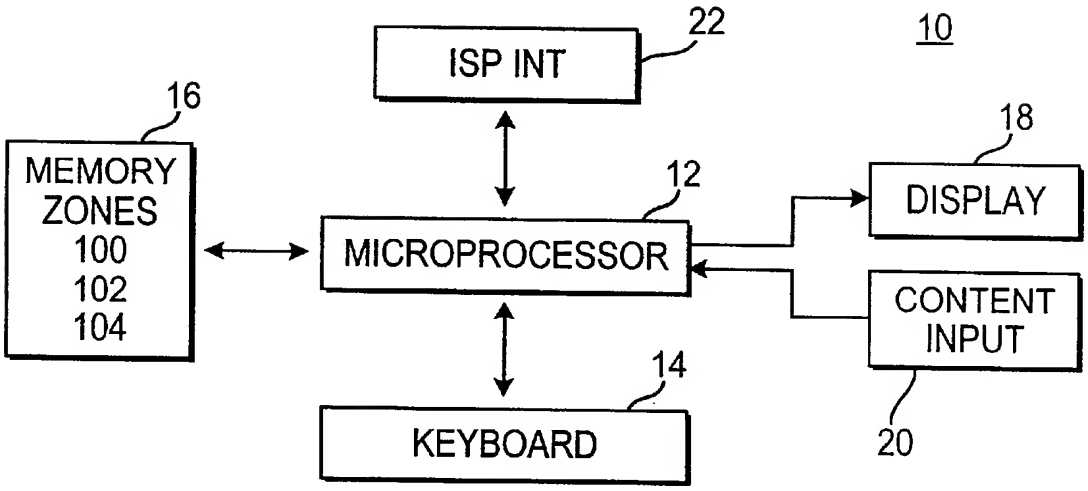

ISP INT
22
10
16
18
MEMORY
ZONES
100
102
104
12
MICROPROCESSOR
DISPLAY
CONTENT
INPUT
14
KEYBOARD
20

FIG. 1

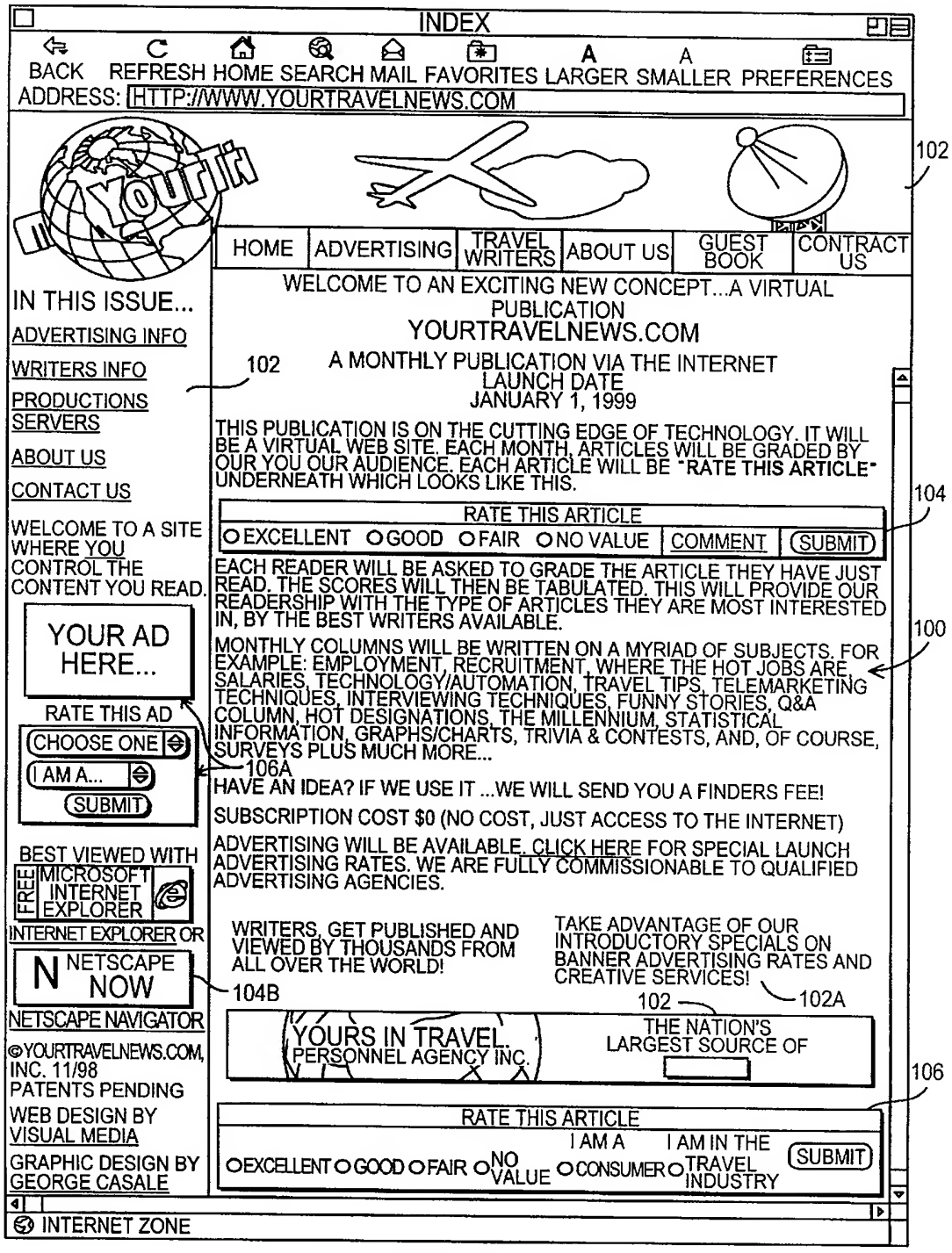

INDEX
BACK REFRESH HOME SEARCH MAIL FAVORITES LARGER SMALLER PREFERENCES
ADDRESS: HTTP://WWW.YOURTRAVELNEWS.COM
YOURTRAVELNEWS.COM
102
HOME
ADVERTISING
TRAVEL WRITERS
ABOUT US
GUEST BOOK
CONTRACT US
IN THIS ISSUE...
ADVERTISING INFO
WRITERS INFO
PRODUCTIONS SERVERS
ABOUT US
CONTACT US
WELCOME TO A SITE WHERE YOU CONTROL THE CONTENT YOU READ.
YOUR AD HERE...
RATE THIS AD
CHOOSE ONE
I AM A...
SUBMIT
106A
BEST VIEWED WITH
FREE MICROSOFT INTERNET EXPLORER
INTERNET EXPLORER OR
NETSCAPE NOW
104B
NETSCAPE NAVIGATOR
©YOURTRAVELNEWS.COM, INC. 11/98
PATENTS PENDING
WEB DESIGN BY VISUAL MEDIA
GRAPHIC DESIGN BY GEORGE CASALE
WELCOME TO AN EXCITING NEW CONCEPT...A VIRTUAL PUBLICATION
YOURTRAVELNEWS.COM
A MONTHLY PUBLICATION VIA THE INTERNET
LAUNCH DATE
JANUARY 1, 1999
THIS PUBLICATION IS ON THE CUTTING EDGE OF TECHNOLOGY. IT WILL BE A VIRTUAL WEB SITE. EACH MONTH, ARTICLES WILL BE GRADED BY OUR YOU OUR AUDIENCE. EACH ARTICLE WILL BE "RATE THIS ARTICLE" UNDERNEATH WHICH LOOKS LIKE THIS.
RATE THIS ARTICLE
EXCELLENT GOOD FAIR NO VALUE COMMENT SUBMIT
104
EACH READER WILL BE ASKED TO GRADE THE ARTICLE THEY HAVE JUST READ. THE SCORES WILL THEN BE TABULATED. THIS WILL PROVIDE OUR READERSHIP WITH THE TYPE OF ARTICLES THEY ARE MOST INTERESTED IN, BY THE BEST WRITERS AVAILABLE.
MONTHLY COLUMNS WILL BE WRITTEN ON A MYRIAD OF SUBJECTS, FOR EXAMPLE: EMPLOYMENT, RECRUITMENT, WHERE THE HOT JOBS ARE, SALARIES, TECHNOLOGY/AUTOMATION, TRAVEL TIPS, TELEMARKETING TECHNIQUES, INTERVIEWING TECHNIQUES, FUNNY STORIES, Q&A COLUMN, HOT DESIGNATIONS, THE MILLENNIUM, STATISTICAL INFORMATION, GRAPHS/CHARTS, TRIVIA & CONTESTS, AND, OF COURSE, SURVEYS PLUS MUCH MORE...
100
HAVE AN IDEA? IF WE USE IT ...WE WILL SEND YOU A FINDERS FEE!
SUBSCRIPTION COST $0 (NO COST, JUST ACCESS TO THE INTERNET)
ADVERTISING WILL BE AVAILABLE. CLICK HERE FOR SPECIAL LAUNCH ADVERTISING RATES. WE ARE FULLY COMMISSIONABLE TO QUALIFIED ADVERTISING AGENCIES.
WRITERS, GET PUBLISHED AND VIEWED BY THOUSANDS FROM ALL OVER THE WORLD!
TAKE ADVANTAGE OF OUR INTRODUCTORY SPECIALS ON BANNER ADVERTISING RATES AND CREATIVE SERVICES!
102
102A
YOURS IN TRAVEL. PERSONNEL AGENCY INC.
THE NATION'S LARGEST SOURCE OF
RATE THIS ARTICLE
EXCELLENT GOOD FAIR NO VALUE
I AM A CONSUMER
I AM IN THE TRAVEL INDUSTRY
SUBMIT
106
INTERNET ZONE

FIG. 2

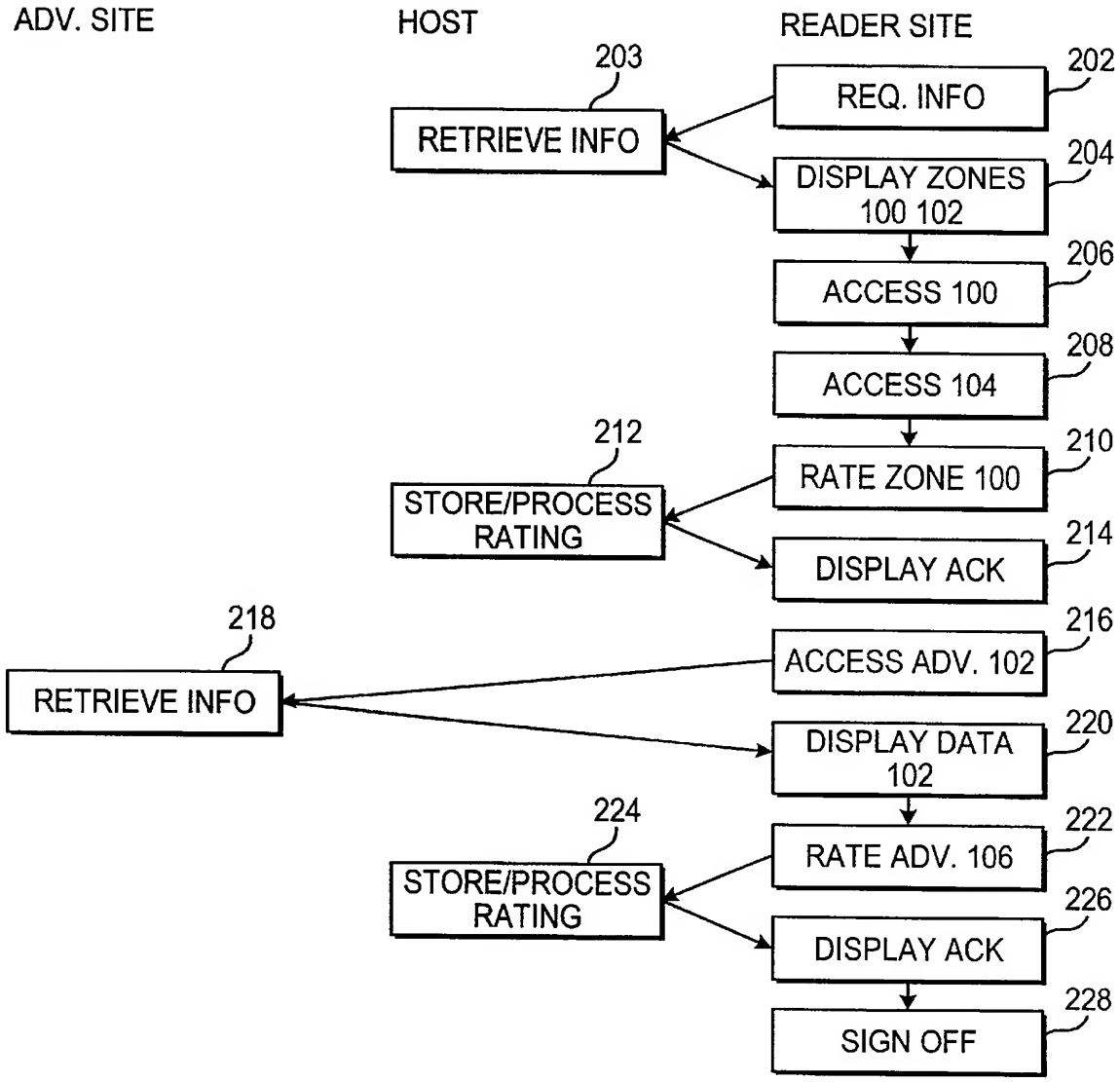

ADV. SITE
HOST
READER SITE
203
RETRIEVE INFO
202
REQ. INFO
204
DISPLAY ZONES 100 102
206
ACCESS 100
208
ACCESS 104
212
STORE/PROCESS RATING
210
RATE ZONE 100
214
DISPLAY ACK
218
RETRIEVE INFO
216
ACCESS ADV. 102
220
DISPLAY DATA 102
224
STORE/PROCESS RATING
222
RATE ADV. 106
226
DISPLAY ACK
228
SIGN OFF

FIG. 3

SURVEY RESULTS

TUE 12/22/98 09:20 EST

ARTICLES

TEST ARTICLE 1				
EXCELLENT	GOOD	FAIR	NO VALUE	PROFILE
41 VOTES 25%	41 VOTES 25%	41 VOTES 25%	41 VOTES 25%	OVERALL RATING: GOOD **TOTAL VOTERS: 164**

HOME PAGE ARTICLE				
EXCELLENT	GOOD	FAIR	NO VALUE	PROFILE
0 VOTES 0%	1 VOTES 100%	0 VOTES 0%	0 VOTES 0%	OVERALL RATING: GOOD **TOTAL VOTERS: 1**

POPUP - TEST COMMENT				
EXCELLENT	GOOD	FAIR	NO VALUE	PROFILE
0 VOTES 0%	1 VOTES 100%	0 VOTES 0%	0 VOTES 0%	OVERALL RATING: GOOD **TOTAL VOTERS: 1**

FIG. 4A

ADVERTISEMENTS

YOURS IN TRAVEL AD				
EXCELLENT	GOOD	FAIR	NO VALUE	PROFILE
2 VOTES 40%	0 VOTES 0%	2 VOTES 40%	1 VOTES 20%	OVERALL RATING: FAIR **TOTAL VOTERS: 5** **CONSUMERS: 3 (60 %)** **INDUSTRY PROFESSIONALS: 2 (40 %)**

ADVERTISE HERE AD				
EXCELLENT	GOOD	FAIR	NO VALUE	PROFILE
3 VOTES 75%	1 VOTES 25%	0 VOTES 0%	0 VOTES 0%	OVERALL RATING: EXCELLENT **TOTAL VOTERS: 4** **CONSUMERS: 3 (75 %)** **INDUSTRY PROFESSIONALS: 1 (25 %)**

FIG. 4B

TEST AD 1				
EXCELLENT	GOOD	FAIR	NO VALUE	PROFILE
102 VOTES 50%	0 VOTES 0%	0 VOTES 0%	101 VOTES 50%	OVERALL RATING: FAIR **TOTAL VOTERS: 203** **CONSUMERS: 102 (50 %)** **INDUSTRY PROFESSIONALS: 101 (50 %)**

BACK TO INDEX

TOTAL ARTICLES FOUND: 3
TOTAL ADVERTISEMENTS FOUND: 3
TOTAL ENTRIES FOUND: 6 ON TUE 12/22/98 09:20 EST

TO REMOVE DATA, ENTER PASSWORD BELOW...

EDIT

EXIT

ANOTHER 3.16 DESIGN!!

FIG. 4C

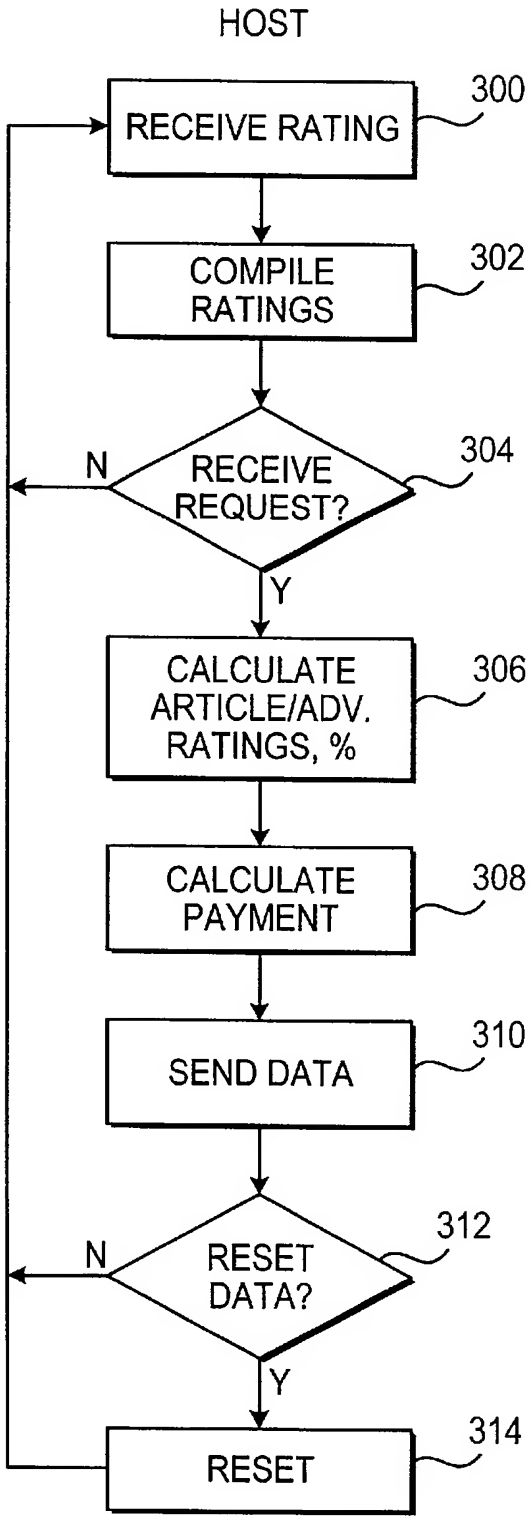

HOST
RECEIVE RATING
300
COMPILE RATINGS
302
RECEIVE REQUEST?
304
N
Y
CALCULATE ARTICLE/ADV. RATINGS, %
306
CALCULATE PAYMENT
308
SEND DATA
310
RESET DATA?
312
N
Y
RESET
314

FIG. 5

WEB SITE WITH AUTOMATIC RATING SYSTEM

BACKGROUND OF THE INVENTION

A. Field of Invention

This invention pertains to a web site host and method of operating the same which provides an automatic rating system for some of its contents. The rating system is used to generate a rating indicium which is sent to the content provider and/or to generate a payment therefor.

B. Description of the Prior Art

Web sites on the Internet are fast becoming the preferred way of providing information to readers. While in the past, a person looking for information had to subscribe to and read numerous magazines and other printed media to obtain certain information, much of the same information is available now on web sites. More particularly, articles covering virtually every facet of the business world as well as information related to relaxation, personal hobbies, vacations and similar subjects related to our private world are being written and published electronically so that they are readily available to any one in the world with a telephone and a PC or a TV set. A major problem that plagues the publishers of such information is how to get paid for the contents being provided. The problem has been solved by providing simultaneously with the information commercial advertisement, using banners or other advertising devices. However another problems that still remains is that it is difficult if not impossible under present conditions to determine whether or not the articles and/or advertisements being provided are satisfactory to the readers. Therefore there is a need in the field of electronic publishing for web page hosting and technique which can collect data from the readers indicative of the perceived quality of its contents.

OBJECTIVES AND SUMMARY OF THE INVENTION

In view of the above, it is the objective of the present invention to provide a system for presenting a web site which automatically collects specific qualitative information regarding the contents of the web site, including information concerning associated advertisement.

A further objective is to provide a host and which generates automatically a data base accumulating and compiling said information in an easily readable and informative format.

Other objectives and advantages of the invention shall become apparent from the following description. An electronic publishing system constructed in accordance with the present invention is used to display data over a computer based distributed network, said data including at least one article and/or advertisement. The system includes a receiving element receiving ratings from a reader evaluating said article and advertisement to generate said ratings, a data storage element receiving and storing information related to a site including at least one article and a plurality of advertisements, said information including said ratings, and a totaling element arranged to total ratings from a plurality of readers to generate rating indicia. The indicia may include, for example, including a combined article rating parameter for said article and/or a combined advertisement rating for said advertisement based on ratings from a plurality of readers. The indicia may further include data indicative of the number of readers who have provided said ratings and the percentage of readers who have rated the

articles or advertisements as being, for instance excellent, good, fair or no value. The system described above is used to generate cumulative rating parameters on a host site of a distributed network based multiple computer information distribution system, said hosting an informational page including a plurality of articles and advertisements, by presenting said articles and advertisements to a plurality of readers, receiving from said readers a rating associated with at least one of said articles and advertisements, accumulating the responses from said readers said ratings, generating a cumulative rating parameter for articles and/or advertisements for which responses have been received; and providing said rating parameters to a requester together with associated statistical information.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** shows a block diagram of a web hosting site in accordance with this invention;

FIGS. **2** show a typical web page with rating zones in accordance with this invention;

FIG. **3** shows a flow chart for the operation of a system in accordance with this invention;

FIGS. **4**A–C shows a typical table or data base for organizing the ratings for the articles and advertisements associated with the host site; and

FIG. **5** shows a flow chart for processing and delivery of the rating information.

DETAILED DESCRIPTION OF THE INVENTION

FIG. **1** shows a system **10** constructed in accordance with this invention which is essentially a web site server consisting of a microprocessor **12**, a keyboard **14**, a memory **16**, a display **18** and a content input device **20**. The memory **16** is used to save the data required to define a specific site. Each site is typically formed of a plurality of web pages and is defined using HTML or similar format. New content may be added through the content input device **20** which may be a floppy driver, or other similar data transfer device. The site is published through an ISP interface **22** in the usual manner.

Memory **16** includes several files, each file defining a web page of the subject site. For example, FIG. **2** shows how a typical page may look to a reader accessing the site. This particular page may describe to the reader how to install a particular piece of hardware on a PC. The page has two distinct zones. The main zone or portion of the page is the text **100** which provides actual content or information required by a reader. This text may include instructions on a computer-related issue, but of course it may include any kind of information, such as, but not restricted to:

Travelogues

Recipes;

Reviews of a book, play, magazine, musical selection or other literary criticism,

Actual literature text.

Also provided in zone **100** may be other types of information besides text, such as graphics, audio and visual information, etc. a second zone **102** is also provided which consists of advertisements. In fact, zone **102** may include a number of such advertisements, which can be spread around or even be embedded in zone **100**, as at **102**A. In other words the two zones **100, 102** need not be completely separated but may overlap in any fashion desired. Moreover, some of the advertisements such as advertisement **104**B may include a link to a different web page. For example, if the content of

zone **100** is a travel-related article describing an exotic location, the advertisements may be for an airline providing service to said location. This type of advertisement, as discussed above, may include a hot link so that 'clicking' on the advertisement may connect the reader to a web site providing information about fares, flight schedules and/or any other information, which may or may not be related to the location described in the main article of zone **100**.

In accordance with this invention, a third type of zone **104, 106** is provided which is associated either with the main text of zone **100** or one of the advertisements of zone **102**. These zones are used to invite the reader to provide rating information about the contents of the associated zone. For instance, in the zone **104** associated with zone **100**, the reader is invited to rate the article as being one of "excellent (E)", "good (G)", "fair (F)" or "no value (NV)." Importantly, another field provided in zone **104** is a "comment" field. The reader may select this field, and then write messages describing his opinion.

Similarly, rating zone **106** associated with advertisement zone **102** is provided to obtain similar information about the respective advertisement. The reader may also be invited to indicate classification (i.e., consumer or travel professional) in the field, as at **106**A.

Once the reader provides a rating, this rating is compiled with previous ratings by other readers in a data base stored in memory **16**.

FIG. **3** shows details of operation of the system. The system consists of several sites remote from each, interconnected by a computer network system such as the Internet. Three of the sites of the system includes a reader site, a host site and an advertisement site.

Starting in step **202**, a reader requests access information related to a subject of interest using ISP **22**. At the host site, the request is received and, in response, information is retrieved from memory **16** (step **203**) which is descriptive of the pages of the subject site including zones **100, 102, 104, 106**. This information is returned to the reader site where in responses the zones **100, 102, 104, 106** are displayed in standard manner (Step **204**).

In step **206**, the reader reads the information or otherwise accesses it. In step **208** the reader accesses zone **104** and in step **210** he rates the article by selecting one of the appropriate bullets of zone **104**. He may also add comments by selecting the "comment" field as discussed above. Once the reader has indicated his rating, he can select the 'submit' button and the rating is transmitted to the site host. At the site host, in step **212** the result of the rating is stored and an acknowledgment screen or message is returned to the reader. This acknowledgment screen or message is displayed in step **214**.

In step **216**, the reader accesses one of the advertisement zones **102** and reads the same. If the zone **102** includes a hot key which is activated by the reader, then in step **216**, a message is sent to the advertising site requesting further information. In step **218** the requested additional information is retrieved and transmitted to the reader site. In step **220** the additional information is displayed.

In step **222** the reader accesses the associated rating site **106** and rates the advertisement in a manner similar to the article of zone **100**. The rating is sent to the host site where it is stored in step **224**. The host site then returns an acknowledgment. In step **226** the acknowledgment is displayed, and in step **228** the reader signs off from the site.

As previously mentioned, after a rating is received, when a request for a rating summary is received or at regular intervals, cumulative rating parameters are calculated for each article and advertisement. For example, the ratings received may be accumulated as follows. A data base is set up for each article and each advertisement. The data base is accumulated as described in the flow chart of FIG. **5**. In step **300** of the flow chart a rating is received, as described in detail in the flow chart of FIG. **3**. This rating may indicate for example that a current reader found an article (for instance, the 'test Article 1') to be excellent. Therefore in step **302** the result of this latest rating is accumulated with previous result, in this case by incrementing the count in the cell under the Excellent column in the row for the first article. As part of step **302**, the total number of ratings for this article is summed.

Similar data bases are also generated for each of the advertisements. The purpose of these data bases, just like for the articles, is to record and summarize the responses from consumers and industry professionals.

In addition, for each rating, a percentage figure is shown indicating how many readers have voted for an article or advertisement as being excellent, etc.

Getting back to FIG. **5**, in step **304** a check is performed to determine if a request has been received for a rating summary. When such a request has been received, then in step **306** an overall rating for each of the various articles is calculated if not performed before.

For example, in FIG. **4**A, the test Article 1 received an overall rating of GOOD from a total of 164 voters. In FIG. **4**B, the advertisement 'YOURS in Travel' received an overall rating "Fair" from a total of 5 voters, 3 of whom (or 60%) were consumers, and 2 (or 40%) were Industry Professionals.

The overall rating for each article or ad is calculated as follows.

The value of "OR" (overall rating) is obtained by calculating the number of entries in each rating sub-category (excellent, fair, good, or no value) for each article or ad. The percentage of the total is then calculated, then each percentage is run through a set of rules that determine the rating.

The rules basically check for any sub-category with the largest percentage. If one is found, that sub-category value is assigned to "OR."

If not found, "equal" status is checked between any two neighboring sub-categories. The value of the higher of the two categories is assigned to "OR."

If not found, either "good" or "fair" is assigned to "OR", depending on which specific sub categories are found to be "equal."

In step **308** a payment amount is generated for each article. This payment amount may be equal to a preselected base fee multiplied by a special rating parameter R of the corresponding article.

For example if the ratings in the respective columns for the subject article are E, G, F, NV then R may be expressed as:

$$R=W1*E+W2*G+W3*F+W4*NV$$

where W1, W2, W3 and W4 are preselected weighing factors. Typical values for these parameters may be 1.5, 1, 0, and 0.

In step **310** the data bases are sent to the requester, or alternatively, only the total columns and the rating parameters are sent. FIGS. **4**A–**4**C illustrate data collected and tabulated by rating, as well as the background (i.e., consumer/industry pro) of the various readers.

In step **312** a check is performed to determine if the data bases are to be reset or edited. If not, normal processing

continues. Otherwise in step **314**, a password is requested, (see bottom of FIG. 4C) and if a correct password is entered, the data and/or the format of the data bases can be edited.

Although the communication between the requester for the rating data and the host site may be performed in any secure manner, preferably a secure, password enabled Internet access means may be used, in which case, the data bases can be presented in the form of web pages.

Moreover, the various page components discussed may be presented to the reader in various forms. For example, instead of being presented co-extensively with zones **100, 102**, rating zones **104, 106** may be presented pop-up menus.

Numerous modifications may be made to this invention without departing from its scope as defined in the appended claims.

I claim:

1. A web site rating system comprising:

a host site and a reader site connected to one another via a computer based distributed network, said host site comprising:

a transmitting element for electronically transmitting at least one article from said host site to said reader site;

a receiving element for receiving rating information from said reader site at which a reader has evaluated and rated said article;

a data storage element for storing said rating information;

a processing element for processing said rating information in response to a request for a rating summary and generating an overall rating of each article based on the rating information received from those of the plurality of readers who have read an article and have provided rating information thereon; and

a payment generator for generating an amount to be paid for the article, the amount being based on a preselected base fee multiplied by a special rating parameter.

2. The system of claim **1** wherein each reader designates one of a plurality of rating levels for said article, and wherein said processing element generates said combined ratings using a preselected relationship for said rating levels.

3. The system of claim **1**, wherein said rating information comprises a rating chosen by the reader from a plurality of rating categories, and

wherein said overall rating of each article is calculated by calculating the total number of readers who submitted ratings for each article, calculating the number of readers who submitted ratings in each rating category for each article, calculating the percentage of readers who submitted a rating for each rating category for each article, and choosing the rating category for which the greatest percentage of readers submitted ratings.

4. The system of claim **1**, wherein said rating information comprises a rating chosen by the reader from a plurality of rating categories (E, G, F, NV), and

wherein said special rating parameter (R) is calculated using the following algorithm:

$$R=W1*E+W2*G+W3*F+W4*NV,$$

where W1, W2, W3 and W4 are preselected weighing factors.

5. A method of generating an amount to be paid for an article stored on a host site of a distributed network based multiple computer information distribution system, said method comprising:

transmitting said article to a plurality of readers at a reader site;

receiving from said readers ratings associated with said article;

storing said ratings in a data storage element;

processing said ratings in response to a request for a rating summary;

generating an overall rating for said article for which ratings have been received;

transmitting said overall rating to a requester together with the number of readers that provided ratings; and

generating the amount to be paid for the article, the amount being based on a preselected base fee multiplied by a special rating parameter.

6. A method of generating an amount to be paid for an article stored on a host site of a distributed network based multiple computer information distribution system, said method comprising:

transmitting the article from the host site to a reader site;

receiving rating information from the reader site at which a reader has evaluated and rated the article;

storing the rating information; and

generating an amount to be paid for the article, the amount being based on the rating information.

7. The method of claim **5** further comprising generating a spread sheet descriptive of the article on a page of said host site, together with corresponding rating parameters, receiving rating information requests and transmitting in response to said requests said spread sheet.

8. The method of claim **5** further comprising displaying a rating menu associated with said article.

9. The method of claim **5** further comprising displaying a rating menu associated with said article, said rating menu indicating a plurality of rating levels; and selecting one of said levels by said reader to generate said rating.

10. The method of claim **9** comprising providing said menu with a reader skill level selection choice, wherein said rating generated by reader includes a reader skill parameter related to said reader skill.

11. The method of claim **10** further comprising generating a spread sheet indicative of ratings selected by readers for various articles.

12. The method of claim **11** further comprising several spread sheets, each spread sheet being associated with a reader skill level.

13. A method of generating an overall rating of an advertisement on a host site of a distributed network based multiple computer information distribution system, said method comprising:

transmitting said advertisement to a plurality of readers at a reader site;

receiving from said readers ratings associated with said advertisement together with the reader's classification in a particular field;

storing said ratings in a data storage element;

processing said ratings in response to a request for a rating summary;

generating an overall rating for said advertisement for which ratings have been received;

transmitting said overall rating to a requester; and

the requester using said overall rating to determine the effectiveness of said advertisement.

14. The method of claim **13**, wherein said receiving step comprises receiving from said readers ratings associated with said advertisement together with information regarding whether the reader is a consumer or a tradesperson.

* * * * *

Appendix C: Related Proceedings

[NONE]